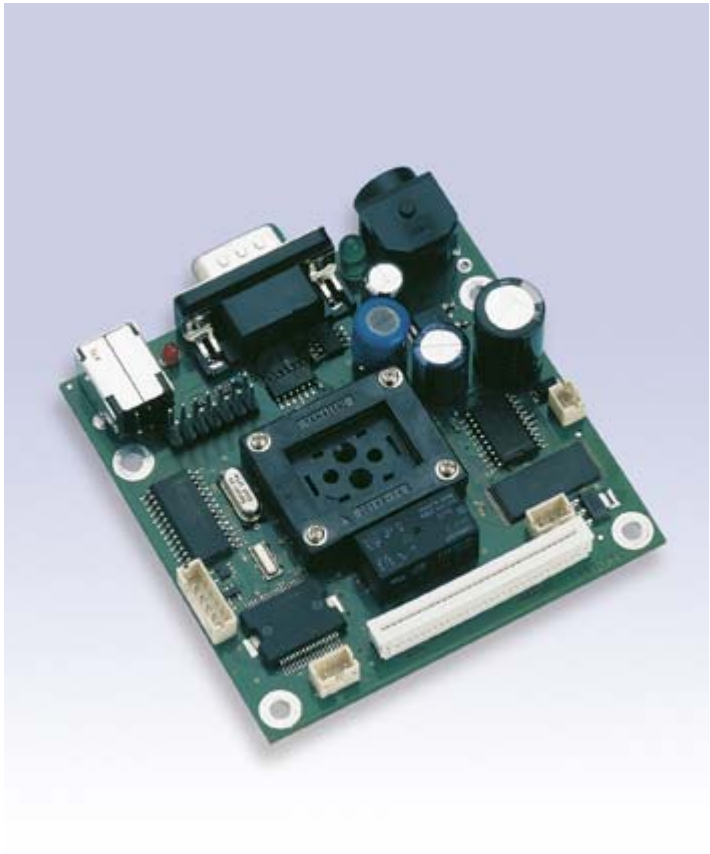
THERMAL PRINTING SOLUTIONS

COMPACT BOARD FOR MCTP/MHTP



User Manual

Reference 3107770

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EVOLUTIONS

Date	Issue	Modifications
10/03	Preliminary	Creation
02/05	Z	Creation

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1 OVERVIEW

This controller board has been designed to drive MHTP/MCTP printer mechanisms with integrated cutter through standard serial communication interface RS232C or USB.

2 GENERAL SPECIFICATIONS

2.1 ***Features***

Communication Interfaces	RS232 / USB 1kb reception buffer
Flash Memory Size	128kb /2Mb
Amount of Flash Memory accessible for user storage	**48 kb** on Compact Board standard 2 Mb external Flash memory
Resident character set	PC Code Pages : 858 and 437
Bar code support	Code 39, UPC-A, UPC-E, JAN8 (EAN), JAN13 (EAN), Interleaved 2 of 55 (ITF), Codabar, Code 128
Print resolution	8 dots/mm
Speed	Up to 100 mm/second throughput (See Note 1)
Drivers available	Windows 98, 2000, XP
Human Interface	Configuration software commands for easy setup

Note 1 :
Reaching and maintaining this print speed requires that data throughput of communication with host matches or exceeds print throughput. With paper quality adapted.

2.2 ***Compliance to legal approval***

EN 60950
CE symbol class B
UL standard

2.3 ***Operating requirements***

General operating requirements

Conducted emission	in accordance with EN 55022 class B
Radiated emission	in accordance with EN 55022 class B
Electrostatic discharge	in accordance with EN 61000-4-2 level 4 (current discharge 8 kV, air discharge 15 kV)
Radiated susceptibility	in accordance with EN 61000-4-3 and EN 61000-4-6 with 10 V/m
Modulated susceptibility	in accordance with EN 50204 with 10 V/m
Fast transient	in accordance with EN 61000-4-4

* Contact AXIOHM for recommendations regarding integration of COMPAxxx to meet those EMC/ESD requirements.

Environmental operating requirements

Standard Operating Temperature range : 0°C to 50°C.
Operating Humidity range : 5% to 90% relative humidity (non-condensing)
Storage/transportation temperature range : - 40°C to 85°C.

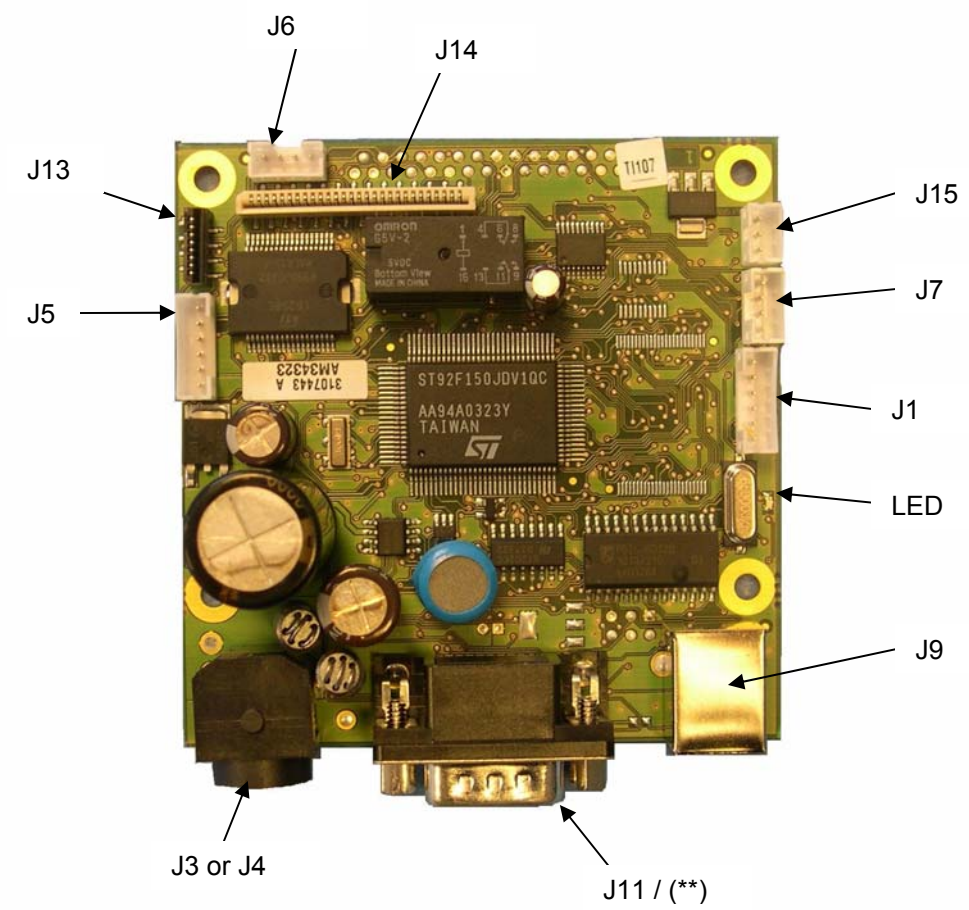
Reliability

The board is designed for a MTBF of 240,000 hours

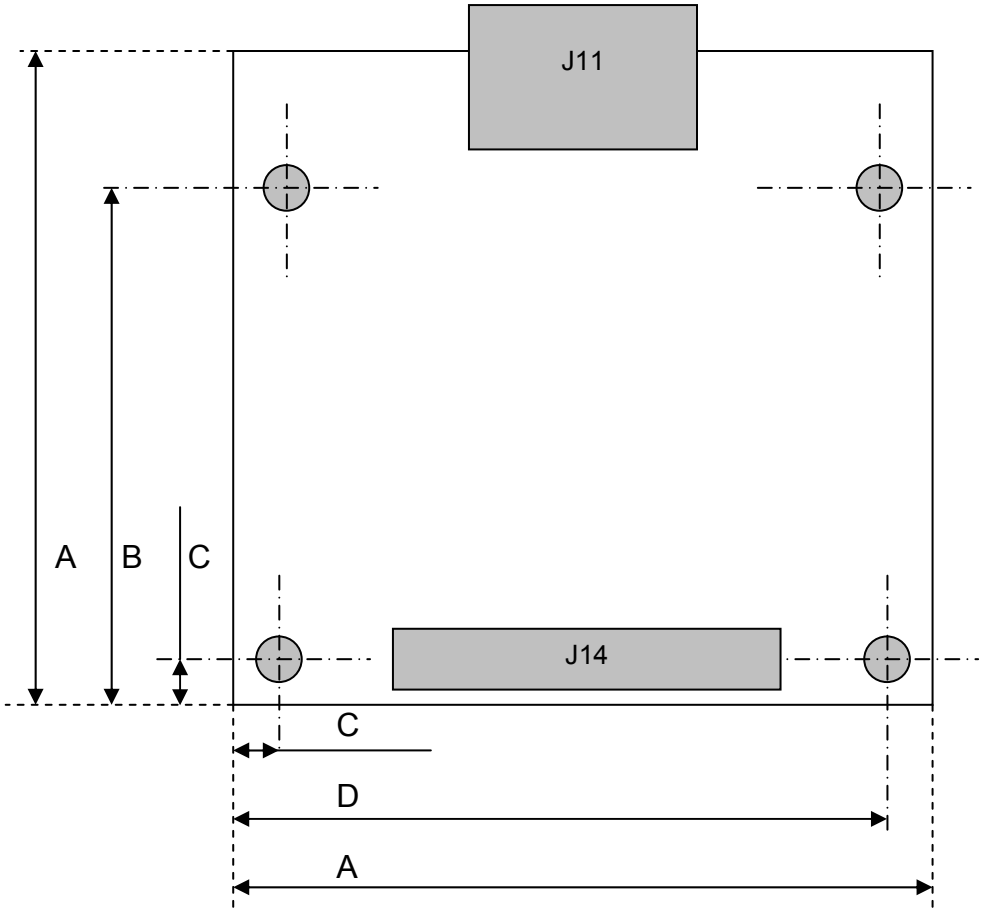
Environmental operating requirements

Standard Operating Temperature range : 0°C to 50°C.
Operating Humidity range : 5% to 90 % relative humidity (non-condensing)
Storage/transportation temperature range : - 20°C to 85°C.

3 BOARD MH/MCTP DESCRIPTION



* : J4 is an option.



PCB DIMENSIONS :

- Length : 80mm = A.
- Width : 80mm = A.
- Thickness : 1.6 mm .
- Height above PCB level max. : 35 mm.
- Height bottom PCB level max. : 4 mm.

FIXING HOLES :

- Four fixing holes diameter 3.5 mm.
- Length position B = 59.5 mm
- Length position C = 4.5 mm.
- Length position D = 75.5 mm.

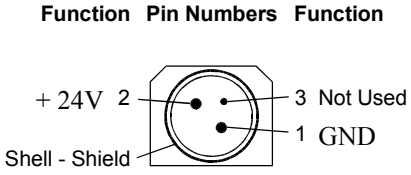
4 POWER SUPPLY

The following illustration shows the power cable connector **J3** and pin assignments. The power cable connector is a 3-pin mini DIN plug and is located at the rear of the board. (or optional 4 pins straight connector **J4**)

J4 : Optional power supply connector:

1 GND
2 GND
3 VCH
4 VCC

The connector is a shielded 3-pin female mini-Din plug.



Remote Power Supply

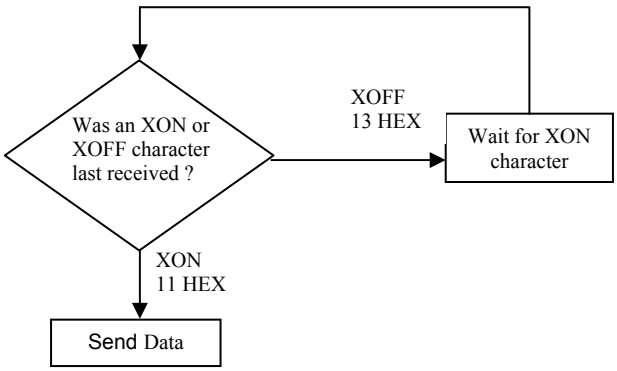
Voltage	24 Vdc ± 10%
Amps	With 75 W Power supply
Short Term (under 1ms)	13 A Peak

5 RS232 PARAMETERS

The RS-232C interface uses either XON/XOFF (software) or DTR/DSR (hardware) protocol to control the flow of information between the computer and the printer.
In XON/XOFF mode, a particular character is sent back and forth between the host and the printer to regulate the communication.
In DTR/DSR mode, changes in the DTR/DSR signal on the RS-232C interface controls the information flow.

5.1 XON/XOFF Protocol

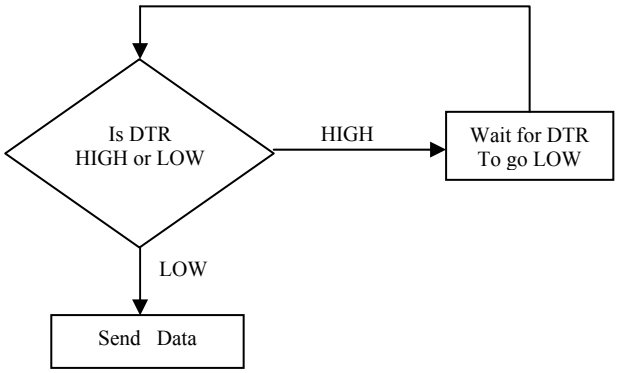
The XON/XOFF characters controls the information transfer between the printer and the host computer. The printer sends an XON character when it is ready to receive data and it sends an XOFF character when it cannot accept any more data. The software on the host computer must monitor the communication link as shown in the following flowchart in order to send data at the appropriate times.
If XON/XOFF has been selected, the printer also toggles the DTR signal, as described in the next section, but it does not look at the DSR signal to transmit data.



XON character = hexadecimal 11.
XOFF character = hexadecimal 13.

5.2 DTR/DSR Protocol

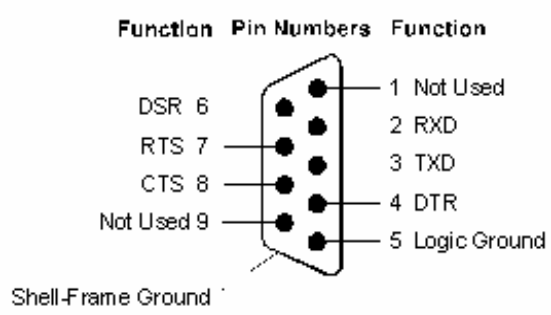
The DTR signal is used to control data transmission to the printer. It is driven low when the printer is ready to receive data and driven high when it cannot accept any more data.



5.3 ***Connectors J11 :***

The following illustration shows the RS-232C communication connector and pin assignment. The connector is located at the rear of the printer, and is specified as male, DB9, 9-pin D-shell, with RTS and CTS pins connected together.

9-pin DB-9 Connector



6 USB PARAMETERS

Axiohm 's implementation of USB complies with "Universal Serial Bus Specification" revision 1.1

6.1 Capabilities

Compact Board is a device only, and doesn't provide hub capabilities.
The maximum recommended cable length is 3 meters.
Full speed communications (12Mbits/sec) are supported.

6.2 Connector J9

The connector is located at the rear of the board, and is of B-type
Refer to USB specification rev 1.1 chapter 6 for more information.

6.3 Interface

The data are exchanged between host and printer via four endpoints:

Endpoint 0x00 : CONTROL
Default endpoint

Endpoint 0x02 : BULK OUT
For transmission of all printable data and commands from host to printer.

Endpoint 0x82 : BULK IN
For return of all synchronous data, status or other types of information except unsolicited status mode messages, from printer to host

Endpoint 0x01 : INTERRUPT OUT
For transmission of real time commands from host to printer.

6.4 Other information

Vendor Id
Axiohm USB Vendor Id = 0x05D9

Product Id
Compact Board Product Id = 0xA000

Note : The USB interface is automatically detected.

7 CONNECTORS DESCRIPTION

J1 : User's Control

1 Paper Feed Switch
2 GND
3 Reset Switch
4 GND
5 Led number 2
6 GND

J14 : Print-head MCTP/MHTP Mechanism ←→ COMPACT BOARD

(**Notes** : Mechanism pin 1←→ pin 28 Board)

1 VCH_IN	**11** GND	**21** GND
2 VCH _IN	**12** Clock	**22** GND
3 Data In	**13** OE1	**23** VCH_IN
4 GND	**14** GND	**24** VCH_IN
5 TH1	**15** GND	**25** VCH_IN
6 GND	**16** OE2	**26** VCH_IN
7 OE1	**17** OE2	**27** VCH_IN
8 OE1	**18** GND	**28** VCH_IN
9 VCC	**19** GND	
10 Strobe	**20** GND	

J5 : Cutter motor

1 Cutter motor A0
2 Cutter motor B0 MA
3 Cutter motor A1
4 Cutter motor B1 MA
5 Collector Sensor Cutter
6 GND

J13 : Opto and switch

1 Switch Door
2 GND
3 Anode sensor paper
4 GND
5 Collector Sensor paper
6 Anode 2nd sensor
7 GND
8 Collector 2nd sensor

J6 : Paper Feed

1 Paper Feed A1
2 Paper Feed B1 AP
3 Paper Feed B0 AP
4 Paper Feed A0

J7 : Cash Drawer Kick Out

1 VCH_IN
2 Control
3 Switch CDKO
4 GND

J15 : Sensor

1 Collector Sensor
2 Anode Sensor
3 GND

GND = 0V
VCC = 5V VCH_IN = 24V

J1 : Connector type JST B6B-PH-K-S.
J5 : Connector type JST B6B-PH-K-S
J13 : Connector type JST B8B-PH-K-S
J7 : Connector type JST B4B-PH-K-S.
J6 : Connector type JST B4B-PH-K-S.
J15 : Connector type JST B3B-PH-K-S.
J14 : Connector type Molex 52808-2890 or 52808-2891

For optional power supply J4,
see 4 - POWER SUPPLY

8 PRINT SPECIFICATION

*8.1 **Characters***

Print Modes

- Available print modes:
- Standard
- Double High
- Double Wide
- Underlined
- Reverse

Size

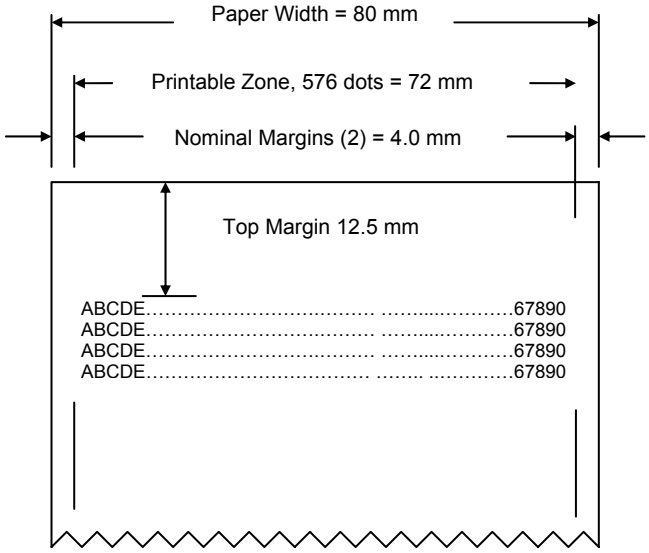
Standard

- Characters per Inch: 16.9.
- Characters per Line: 48 for 80 mm Paper
- Characters per Line: 53 for 82.5 mm Paper
- Cell Size: 12 x 24 Dots

8.2 ***Print zone***

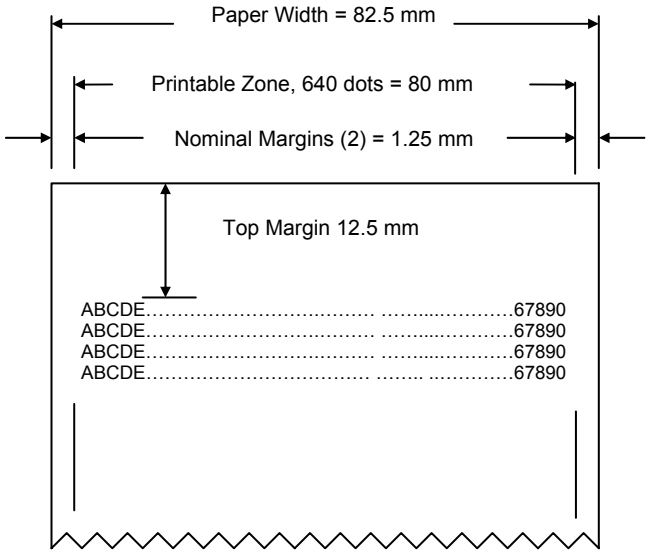
Print Zones for 80 mm (3.15 inches) paper:

- 576 dots (addressable) @ 8 dots/mm, centered on 80 mm
- Standard Mode: minimum margins: 4.0 mm (.157 inches)
- Top margin to knife cut: 12.5 mm (0.49 inches)



Print zone for 82.5 mm (3.25 inches) paper:

- 640 dots (addressable) @ 8 dots/mm, centered on 82.5 mm
- Standard mode: minimum margins: 1.25 mm (0.05 inches)
- Top margin to knife cut: 12.5 mm (0.49 inches)



8.3 ***Print density and density of receipt print lines***

This function makes it possible to adjust the energy level of the printhead to darken the printout. An adjustment should only be made when necessary. The factory setting is 100%.

Warning:

Choose an energy level no higher than necessary to achieve a dark printout.

Failure to observe this rule may result in a printer service call or voiding of the printer warranty. Consult your Axiohm technical support specialist if you have any questions.

8.4 ***Duty cycle restrictions (printing solid blocks)***

There are restrictions on the duty cycle because of the heat generated by the receipt thermal print head when printing solid blocks (regardless of the length of the block in relation to the print line). The restrictions are ambient temperature, the percentage of time (measured against one minute) of continuous solid printing, and the amount of coverage.

Caution: When the duty cycle approaches the limits shown in the table, the receipt print head will heat up. If print head temperature exceeds 65 °C, a safety feature will shut down the print head to prevent damage.

Another cause for duty cycle restriction is paper feed motor temperature increase due to continuous printing.

Allowable Duty Cycle (measured over one minute of continuous printing)

Amount of Solid Coverage	**Ambient Temperature**		
	25°C	35° C	50° C
20%	100% during first 3 minutes of continuous printing. 50% after the 3 minutes.	50%	20%
40%	50%	25%	10%
100%	20%	10%	4%

For reference:

- A typical receipt with text (contains some blank spaces) is approximately 12% dot coverage.
- A full line of text characters (every cell on the line has a character in it) is approximately 25% dot coverage.
- Graphics are approximately 40% dot coverage.
- Barcodes are approximately 50% dot coverage.
- A solid black line is 100% dot coverage.

8.5 ***Character sets***

Code Page 858

00 0	10 16	20 32	30 0 48	40 @ 64	50 P 80	60 ` 96	70 p 112	80 Ç 128	90 É 144	A0 á 160	B0 ⁝ 176	C0 └ 192	D0 ð 208	E0 Ó 224	F0 – 240
01 1	11 17	21 ! 33	31 1 49	41 A 65	51 Q 81	61 a 97	71 q 113	81 ü 129	91 æ 145	A1 í 161	B1 ▒ 177	C1 ┴ 193	D1 Ð 209	E1 ß 225	F1 ± 241
02 2	12 18	22 " 34	32 2 50	42 B 66	52 R 82	62 b 98	72 r 114	82 é 130	92 Æ 146	A2 ó 162	B2 ▓ 178	C2 ┬ 194	D2 Ê 210	E2 Ô 226	F2 ‗ 242
03 3	13 19	23 # 35	33 3 51	43 C 67	53 S 83	63 c 99	73 s 115	83 â 131	93 ô 147	A3 ú 163	B3 │ 179	C3 ├ 195	D3 Ë 211	E3 Ò 227	F3 ¾ 243
04 4	14 20	24 $ 36	34 4 52	44 D 68	54 T 84	64 d 100	74 t 116	84 ä 132	94 ö 148	A4 ñ 164	B4 ┤ 180	C4 ─ 196	D4 È 212	E4 õ 228	F4 ¶ 244
05 5	15 21	25 % 37	35 5 53	45 E 69	55 U 85	65 e 101	75 u 117	85 à 133	95 ò 149	A5 Ñ 165	B5 Á 181	C5 ┼ 197	D5 € 213	E5 Õ 229	F5 § 245
06 6	16 22	26 & 38	36 6 54	46 F 70	56 V 86	66 f 103	76 v 118	86 å 134	96 û 150	A6 ª 166	B6 Â 182	C6 ã 198	D6 Í 214	E6 µ 230	F6 ÷ 246
07 7	17 23	27 ' 39	37 7 55	47 G 71	57 W 87	67 g 103	77 w 119	87 ç 135	97 ù 151	A7 º 167	B7 À 183	C7 Ã 199	D7 Î 215	E7 þ 231	F7 ¸ 247
08 8	18 24	28 (40	38 8 56	48 H 72	58 X 88	68 h 104	78 x 120	88 ê 136	98 ÿ 152	A8 ¿ 168	B8 © 184	C8 ╚ 200	D8 Ï 216	E8 Þ 232	F8 º 248
09 9	19 25	29) 41	39 9 57	49 I 73	59 Y 89	69 i 105	79 y 121	89 ë 137	99 Ö 153	A9 ® 169	B9 ╣ 185	C9 ╔ 201	D9 ┘ 217	E9 Ú 233	F9 ¨ 249
0A 10	1A 26	2A * 42	3A : 58	4A J 74	5A Z 90	6A j 106	7A z 122	8A è 138	9A Ü 154	AA ¬ 170	BA ║ 186	CA ╩ 202	DA ┌ 218	EA Û 234	FA · 250
0B 11	1B 27	2B + 43	3B ; 59	4B K 75	5B [91	6B k 107	7B { 123	8B ï 139	9B ø 155	AB ½ 171	BB ╗ 187	CB ╦ 203	DB ▉ 219	EB Ù 235	FB ¹ 251
0C 12	1C 28	2C , 44	3C < 60	4C L 76	5C \ 92	6C l 108	7C | 124	8C î 140	9C £ 156	AC ¼ 172	BC ╝ 188	CC ╠ 204	DC ▄ 220	EC ý 236	FC ³ 252
0D 13	1D 29	2D - 45	3D = 61	4D M 77	5D] 93	6D m 109	7D } 125	8D ì 141	9D Ø 157	AD ¡ 173	BD ¢ 189	CD ═ 205	DD ¦ 221	ED Ý 237	FD ² 253
0E 14	1E 30	2E . 46	3E > 62	4E N 78	5E ^ 94	6E n 110	7E ~ 126	8E Ä 142	9E × 158	AE « 174	BE ¥ 190	CE ╬ 206	DE Ì 222	EE ¯ 238	FE ■ 254
0F 15	1F 31	2F / 47	3F ? 63	4F O 79	5F _ 95	6F o 111	7F △ 127	8F Å 143	9F ƒ 159	AF » 175	BF ┐ 191	CF ¤ 207	DF ▀ 223	EF ´ 239	FF 255

Code Page 437

00 0	10 16	20 SP 32	30 0 48	40 @ 64	50 P 80	60 ` 96	70 p 112	80 Ç 128	90 É 144	A0 á 160	B0 ⁝ 176	C0 └ 192	D0 ╨ 208	E0 ∝ 224	F0 ≡ 240
01 1	11 17	21 ! 33	31 1 49	41 A 65	51 Q 81	61 a 97	71 q 113	81 ü 129	91 æ 145	A1 í 161	B1 ⁞ 177	C1 ┴ 193	D1 ╤ 209	E1 β 225	F1 ± 241
02 2	12 18	22 " 34	32 2 50	42 B 66	52 R 82	62 b 98	72 r 114	82 é 130	92 Æ 146	A2 ó 162	B2 ⁞ 178	C2 ┬ 194	D2 ╥ 210	E2 Γ 226	F2 ≥ 242
03 3	13 19	23 # 35	33 3 51	43 C 67	53 S 83	63 c 99	73 s 115	83 â 131	93 ô 147	A3 ú 163	B3 ⁞ 179	C3 ├ 195	D3 ╙ 211	E3 π 227	F3 ≤ 243
04 4	14 20	24 $ 36	34 4 52	44 D 68	54 T 84	64 d 100	74 t 116	84 ä 132	94 ö 148	A4 ñ 164	B4 ⁞ 180	C4 ─ 196	D4 ╘ 212	E4 Σ 228	F4 ⌠ 244
05 5	15 21	25 % 37	35 5 53	45 E 69	55 U 85	65 e 101	75 u 117	85 à 133	95 ò 149	A5 Ñ 165	B5 ⁞ 181	C5 ┼ 197	D5 ╒ 213	E5 σ 229	F5 ⌡ 245
06 6	16 22	26 & 38	36 6 54	46 F 70	56 V 86	66 f 103	76 v 118	86 å 134	96 û 150	A6 ª 166	B6 ⁞ 182	C6 ╞ 198	D6 ╓ 214	E6 µ 230	F6 ÷ 246
07 7	17 23	27 ' 39	37 7 55	47 G 71	57 W 87	67 g 103	77 w 119	87 ç 135	97 ù 151	A7 º 167	B7 ⁞ 183	C7 ╟ 199	D7 ╫ 215	E7 τ 231	F7 ≈ 247
08 8	18 24	28 (40	38 8 56	48 H 72	58 X 88	68 h 104	78 x 120	88 ê 136	98 ÿ 152	A8 ¿ 168	B8 ⁞ 184	C8 ╚ 200	D8 ╪ 216	E8 ϕ 232	F8 ° 248
09 9	19 25	29) 41	39 9 57	49 I 73	59 Y 89	69 i 105	79 y 121	89 ë 137	99 Ö 153	A9 ⌐ 169	B9 ⁞ 185	C9 ╔ 201	D9 ┘ 217	E9 Θ 233	F9 ● 249
0A 10	1A 26	2A * 42	3A : 58	4A J 74	5A Z 90	6A j 106	7A z 122	8A è 138	9A Ü 154	AA ¬ 170	BA ⁞ 186	CA ╩ 202	DA ┌ 218	EA Ω 234	FA • 250
0B 11	1B 27	2B + 43	3B ; 59	4B K 75	5B [91	6B k 107	7B { 123	8B ï 139	9B ¢ 155	AB ½ 171	BB ⁞ 187	CB ╦ 203	DB ⁞ 219	EB δ 235	FB √ 251
0C 12	1C 28	2C , 44	3C < 60	4C L 76	5C \ 92	6C l 108	7C | 124	8C î 140	9C £ 156	AC ¼ 172	BC ⁞ 188	CC ╠ 204	DC ▄ 220	EC ∞ 236	FC n 252
0D 13	1D 29	2D - 45	3D = 61	4D M 77	5D] 93	6D m 109	7D } 125	8D ì 141	9D ¥ 157	AD ¡ 173	BD ⁞ 189	CD ═ 205	DD ▌ 221	ED ∅ 237	FD ² 253
0E 14	1E 30	2E . 46	3E > 62	4E N 78	5E ^ 94	6E n 110	7E ~ 126	8E Ä 142	9E Pt 158	AE « 174	BE ⁞ 190	CE ╬ 206	DE ▐ 222	EE ε 238	FE ■ 254
0F 15	1F 31	2F / 47	3F ? 63	4F O 79	5F _ 95	6F o 111	7F DEL △ 127	8F Å 143	9F ƒ 159	AF » 175	BF ⁞ 191	CF ╧ 207	DF ▀ 223	EF ∩ 239	FF BLANK 255

9 PRINTER CONFIGURATION

Printers are generally shipped with all the functions and parameters pre-set at the factory.
The configuration can be changed by using software commands as described in the "Configuration Commands" chapter.

9.1 List of parameters that can be changed

Set Mechanism Options

- Type
  - **Standard ***
  - Bi-station
- Voltage
  - 12V
  - **24V ***
- Paper Width
  - **80mm ***
  - 82.5mm
- Paper Entry
  - **Clamshell ***
  - Autoload
- Print density
  - 80% - 120%
  - default **100%**
- Knife Option
  - **Disabled***
  - Standard Mode
  - Low noise Mode
- Partial Cut Distance
  - 0 Steps
  - 8 Steps
  - **16 Steps ***
  - 24 Steps
  - 32 Steps
- Cover Sensor Option
  - Enabled
  - **Disabled***
- Optional Sensor
  - **Disabled ***
  - 2nd Paper Out
- Pre-Heating
  - Enabled
  - **Disabled ***
- Paper Low Sensor
  - **Disabled ***
  - Enabled

Set Print Options

- Mode Top Of Form
  - Enabled
  - **Disabled***
- TOF Sensor Threshold
  - 0-255
- Default Font
  - **Resident ***
  - User Defined
- Default Code Page
  - **858 ***
  - 437

Set Communication Options

- Interface Type
  - RS232
  - USB
- RS232 Baud Rate
  - **115200 ***
  - 57600
  - 38400
  - 19200
  - 9600
- RS232 Data Bits
  - **8 ***
  - 7
- RS232 Stop Bit(s)
  - **1 ***
  - 2
- RS232 Parity
  - **No Parity ***
  - Even Parity
  - Odd Parity
- RS232 Flow Control
  - **DTR/DSR ***
  - XON/XOFF

*** Standard factory default settings** (*for further information, please contact your distributor or Axiohm Technical Support Team at* ***www.axiohm.com***)

10 SELF TEST TICKET DESCRIPTION

The self test ticket can be printed by pressing both Reset and Paper feed button and realising the Reset button.
Here is the description of all the lines that you can read when you print a self test.

- Model Number	:	- This is a 15 digit number fixed by Axiohm.
- Serial Number	:	- This is a 10 digits number fixed by Axiohm First letter: always D Next two digits: year of production Next two digits: week of production Next 5 digits: incremental number that is reset every Monday morning.
HARDWARE		
- Flash Memory Size	:	- Total size of the flash memory main code.
- External Flash	:	- External flash present (option Hardware 2MBytes)
- Flash Size User	:	- Flash memory allocated for logos or user defined fonts.
- SRAM Size	:	- Total size of the RAM Memory
- CPU Clock Freq.	:	- Microprocessor Clock frequency.
MECHANISM		
- Type	:	- Mechanism series.
- Voltage	:	- Printhead Voltage.
- Paper Width	:	- Paper width used.
- Paper Entry	:	- Select which paper entry used.
- Print Density	:	- Percentage of the nominal heating time value for specified paper.
- Knife	:	- Enable Knife Operation.
- Partial Cut	:	- Indicate the number of motor steps to perform a partial cut.
- Cover Sensor	:	- Enable Cover sensor management
- Paper Low Sensor	:	- Enable Paper Low sensor management.
Opto. Threshold	:	- Set Paper low threshold.
- Pre Heating	:	- This mode is used to maintain print head temperature above minimum value.
- Max Speed	:	- Printer top speed limit.

COMMUNICATION		
- RX Buffer Size	:	- This indicates the size of the data Input buffer (Bytes).
- Interface Type	:	- Indicates if RS232 or USB interface is used. Automatic detection of USB interface
Baud rate	:	Baud rate Value.
Data Bits	:	Number of data bits.
Stop Bit(s)	:	Number of stop bit(s).
Parity	:	Type of parity to control frame validity.
Flow Control	:	Hardware or software handshaking.
Reception Errors	:	Indicates which action is to be done when a wrong data is received.
PRINT OPTIONS		
- Mode Top Of Form	:	- Indicates TOF is managed by the controller board.
Paper Path	:	- Indicates distances between TOF sensor and cut line
Mark Distance	:	- Indicates the distance between TOF marks
Search Distance	:	- Additional distance for Research
Cut Distance	:	- Distance between Knife and TOF mark
Sensor Threshold	:	- TOF sensor detection level
- User Logo defined	:	- Current status = Yes if at least one logo is defined.
- User Char defined	:	- Current status = Yes if at least one font is defined.
- Code Page (437,858)	:	Indicates default internal code page selected upon reset.

(*For further information, please contact your distributor or Axiohm Technical Support Team at* ***www.axiohm.com***)

11 LIST OF CONTROL CODES

Code (Hexadecimal)	Command	Page
09	Horizontal Tab	33
0A	Print and Feed One Line	30
0C	Form Feed	30
0D	Activate Carriage Return	30
10 04 *n*	Real Time Status Transmission	58
10 05 *n*	Real Time Recovery from Fault	61
11 *n1...n48*	Print Raster Graphics	45
14 *n*	Feed *n* Print Lines	30
15 *n*	Feed *n* Dot Rows	31
1B 20 *n*	Set Right-Side Character Spacing	33
1B 21 *n*	Select Print Mode	38
1B 24 *nL nH*	Set Absolute Starting Position	34
1B 2D *n*	Select or Cancel Underline Mode	39
1B 32	Set Line Spacing to 1/6 Inch	31
1B 33 *n*	Set Line Spacing	31
1B 40	Initialize Printer	27
1B 44 [*n*]...*k* NUL	Set Horizontal Tab Positions	34
1B 4A *n*	Print and Feed Paper	32
1B 52 *n*	Select International Character Set	40
1B 5B 7D	Switch to Flash Download Mode	66
1B 5C *nL nH*	Set Relative Print Position	35
1B 61 *n*	Select Justification	36
1B 64 *n*	Print and Feed *n* Lines	32
1B 69	Perform Full Knife Cut	28
1B 6D	Perform Partial Knife Cut	28
1B 70 *m t1 t2*	Generate Pulse For CDKO	71
1B 74 *n*	Select Character Code Table or Active User-defined Font Selection	41
1B 76	Transmit Paper Sensor Status	49
1C 46 *t*	Read Font Information	41
1C 48	Check Easy font Compatibility	43
1C 4C F8 t w h dn	Download Single Byte Font	44
1D 01	Request Flash Memory Size	66
1D 02 *n n*	Select Flash Memory Sector to Download	66
1D 06	Get Flash Firmware CRC Status	67
1D 07	Return Boot Sector CRC	67
1D 08	Return SRAM Size	50
1D 0A	Return Hardware Information.	50
1D 0E	Erase All Flash Contents Except Boot Sector	67

Code (Hexadecimal)	Command	Page
1D 0F	Return Main Program Flash CRC	68
1D 10 *n*	Erase Selected Flash Sector	68
1D 11 *al ah cl ch d1…dn – [BP]*	Download to Active Flash Sector	69
1D 23 *n*	Select the Current Logo	46
1D 2A *n1 n2 d1...dn*	Define Downloaded Bit Image in Flash Memory	46
1D 2F *m*	Print Downloaded Bit Image	47
1D 40 *n*	Erase User Flash Sector	70
1D 42 *n*	Select or Cancel White/Black Reverse Print Mode	39
1D 48 *n*	Select Printing Position of HRI Characters	62
1D 49 *n*	Transmit Printer ID	51
1D 49 40 *n*	Transmit Printer ID, Remote Diagnostics Extension	52
1D 4C *nL nH*	Set Left Margin	36
1D 56 *m*	Select Cut Mode	29
1D 56 *m n*	Select Cut Mode and Cut Paper	29
1D 57 *nL nH*	Set Printing Area Width	37
1D 68 *n*	Select Bar Code Height	62
1D 6B *m n d1...dn*	Print Bar Code First Variation	63
1D 6B *m d1...dk* NUL	Print Bar Code Second Variation	63
1D 6C *m*	Transmit Selected A/D Channel	53
1D 72 *n*	Transmit Status (Paper sensor status, Drawer kick out status, Flash memory user sector status)	54
1D 73 n m	Store Selected Sensor Threshold	72
1D 74	Automatically Calibrate TOF sensor	72
1D 77 *n*	Select Bar Code Width	64
1D FF	Reset Firmware	27
1F 01 *d1…dn*	Erase Boot Sector, Download New Code	69
1F 02 *n1 n2 n3 n4 n5 n6*	Set Communication Interface Parameters	73
1F 03 02 n	Set Knife Option	74
1F 03 03 *n*	Paper Low Sensor Option	74
1F 03 08 *n*	Set Paper Width Parameter	75
1F 03 0A *n*	Set Partial Cut Distance for MH/MCTP mechanism	75
1F 03 0B *n*	Set Preheating Mode	76
1F 03 80 *n*	Default Code Page Resident Font	76
1F 03 87 *n*	Set Top Of Form Mode	77
1F 03 89 *n*	Set Cover Sensor Option	77
1F 03 8B *n*	Set Mechanism Type	78
1F 03 97 *n*	Set Additional Distance Search to Find one TOF	78
1F 03 98 *n*	Set Inter-Mark Distance	79

1F 03 99 *n*	Set Cut Distance For TOF	79
1F 03 A1 *n*	Set Voltage Mechanism	80
1F 03 A2 *n*	Set Paper Introduction Type	81
1F 03 A9 *n*	Set 2nd Paper Out Sensor Option	
1F 0B 4E 52 4A *n*	Set Print Density	82
1F 0D 43 4C 45 *n*	Reset NVRAM Parameters	83
1F 0E 01 *nL nH*	Set Partial Cut Bi-Station Mode	84
1F 4D *nL nH*	Reverse Paper Feed	32
1F 56	Send Printer Software Version	55
1F 65 *n*	Return Logo Checksum	48
1F 74	Print Test Form	71
1F 76 n	Buffered Status transmission (Error status, Sensor status)	56
1F 77 *n*	Return User Flash Memory Allocation Status	70

12 COMMAND DESCRIPTION

12.1 ***Command conventions***

The following information describes how each command is organized:

Command Name
A designation (not the ASCII code) used to identify the command.

Description
A brief summary of the command, followed by detailed information, if necessary.

ASCII	the ASCII control code
Hexadecimal	the Hexadecimal control code
Decimal	the Decimal control code
Value or Values	a description of the command operand values
Range	the upper and lower limits of the command operand
Default	the command operand default after printer reset
Formulas	any formula used for this command.

Exceptions
Describes any exceptions to this command, for example, other commands that the command cannot be used with.

Related Information
This section describes any related information for this command and provides references to other sections for additional information.

*12.2 **Reset commands***

INITIALIZE PRINTER

Clears the print line buffer and resets the printer to the default settings for the startup configuration (refer to Default settings below).

ASCII	ESC @
Hexadecimal	**1B 40**
Decimal	27 64

Default Single Wide, Single-High and Left-Aligned characters and reset active logo.
Default bar code settings

	80mm	82.5mm
Character Pitch	16.9 CPI	16.9 CPI
Number of Columns Width	48 characters	53 characters
Extra Dot Rows	3	3
Character Set	Default	Default
Printing Position	Column One	Column One

RESET FIRMWARE

Reboots the printer.

ASCII	GS (SPACE)
Hexadecimal	**1D FF**
Decimal	29 255

12.3 Paper cut commands

PERFORM FULL KNIFE CUT

Cuts the receipt.

ASCII	ESC *i*
Hexadecimal	**1B 69**
Decimal	27 105

Exception : The sequence will be ignored if paper length less than 13mm (104 dot lines)

PERFORM PARTIAL KNIFE CUT

Partially cuts the receipt.
See Setting Partial Cut Distance in Diagnostics.
(See command 1F 03 0A n or 1F 0E 01 nL nH)

ASCII	ESC *m*
Hexadecimal	**1B 6D**
Decimal	27 109

Exceptions:
The command is valid only at the beginning of a line.
The sequence will be ignored if paper length less than 13mm (104 dot lines)

SELECT CUT MODE AND CUT PAPER

Selects a mode for cutting paper and cuts the paper. There are two formats for this command: one requiring one parameter *m*; the other requiring two parameters, *m* and *n*; the format is indicated by the parameter *m*.

ASCII	GS V *m*	GS V *m n*
Hexadecimal	**1D 56 *m***	**1D 56 *m n***
Decimal	29 86 *m*	29 86 *m n*

Operand: *m* = cut mode
n = additional distance to feed prior to cut beyond the cut position

Value of *m* Selects the mode as shown in the table
Value of *n* Determines the cutting position

Limit:	OPTION 1:		OPTION 2:	
	Decimal:	$0 \le m \le 1$; $48 \le m \le 49$	$65 \le m \le 66$	$0 \le n \le 255$
	Hex:	$00 \le m \le 1$; $30 \le m \le 31$	$41 \le m \le 42$	$00 \le n \le FF$

Exception:
The sequence will be ignored if paper length less than 13mm (104 dot lines)

"GS V" OPERAND DEFINITION		
M		**Cut mode**
Decimal	**Hex**	
0, 48	00, 30	Full cut
1, 49	01, 31	Partial cut
65	41	Feeds paper *n* steps beyond the cut position, then executes a full cut
66	42	Feeds paper *n* steps beyond the cut position, then executes a partial cut

12.4 *Vertical positioning and print commands*

The vertical positioning and print commands control the vertical print positions of characters on the receipt.

PRINT AND FEED ONE LINE

Prints one line from the buffer and feeds paper one line.

ASCII	LF
Hexadecimal	**0A**
Decimal	10

FORM FEED

Feeds paper until a mark is detected.
(Maximum search distance see code 1F 03 97 n – Reply Status see code 1F 76 02).

ASCII	FF
Hexadecimal	**0C**
Decimal	12

Exceptions:
The command is valid only on Top Of Form mode (1F 03 87 n) else is ignored.

Notes about TOF

- The TOF detection algorithm utilizes the paper out sensor to detect black marks. To perform the two functions with the same sensor requires a specific management.

ACTIVATE CARRIAGE RETURN

Prints one line from the buffer and feeds paper one line.
Some applications expect the command to be ignored, while others use it as print command.

ASCII	CR
Hexadecimal	**0D**
Decimal	13

FEED *n* PRINT LINES

Feeds the paper *n* lines at the current line height without printing; ignored if not at start of line.

ASCII	DC4 *n*
Hexadecimal	**14 *n***
Decimal	20 *n*

Value of *n*	The number of lines to feed at current line height setting.
Range of *n*	1-255

FEED *n* DOT ROWS

Feeds the paper *n* dot rows (*n*/203 inch, *n*/8 mm), without printing.

ASCII	NAK *n*
Hexadecimal	**15 *n***
Decimal	21 *n*

Value of *n* *n*/203 inch

Range of *n* 1-255

SET LINE SPACING TO 1/6 INCH

Sets the default line spacing to 1/6 of an inch (4,23 mm).

ASCII	ESC 2
Hexadecimal	**1B 32**
Decimal	27 50

SET LINE SPACING

Sets the line spacing to *n*/406 inch (*n*/16 mm).
The minimum line spacing is 8.5 lines per inch. The line spacing equals the character height when *n* is too small.

ASCII	ESC 3 *n*
Hexadecimal	**1B 33 *n***
Decimal	27 51 *n*

Value of *n* *n*/406 inch

Range of *n* 0-255

Default 0.13 inch (3.37 mm)

Exception
The command is valid only at the beginning of a line.

PRINT AND FEED PAPER

Prints one line from the buffer and feeds the paper *n*/203 inch (*n*/8 mm). The line height equals the character height when *n* is too small.

Sets the print starting position to the beginning of the line, after printing is completed.

ASCII	ESC J *n*
Hexadecimal	**1B 4A *n***
Decimal	27 74 *n*
Value of *n*	*n*/203 inch
Range of *n*	0-255

PRINT AND FEED *N* LINES

Prints one line from the buffer and feeds paper *n* lines at the current line height.

ASCII	ESC d *n*
Hexadecimal	**1B 64 *n***
Decimal	27 100 *n*
Range of *n*	0-255

REVERSE PAPER FEED

Execute a reverse paper feed.

ASCII	US	M	*nL*	*nH*
Hexadecimal	**1F**	**4D**	**nL**	**nH**
Decimal	31	77	*nL*	*nH*

Operand: n = ((nH * 256) + nL)
= Distance number of dot line (1/8 mm)

Limit : Dec: 0 < n < 32768
Hex: 00 < n < 8000

Note : Beware when using this sequence, to be sure that the paper will still be inside the printer mechanism.

12.5 ***Horizontal positioning commands***

The horizontal positioning commands control the horizontal print positions of characters on the receipt.

HORIZONTAL TAB

Moves the print position to the next tab position set by the Set Horizontal Tab Positions (1B 44 *n*1 *n*2 ... 00) command.
The print position is reset to column one after each line.
When no tabs are defined to the right of the current position, or if the next tab is past the right margin, Line Feed is executed.
Print initialization sets 32 tabs at column 9, 17, 25,…

ASCII	HT
Hexadecimal	**09**
Decimal	9

SET RIGHT-SIDE CHARACTER SPACING

Sets the right side character spacing to [*n*].

ASCII	ESC SP *n*
Hexadecimal	**1B 20 *n***
Decimal	27 32 *n*
Range of *n*	0 – 32
Default	0

Note: where n is a multiple of 4.

SET ABSOLUTE STARTING POSITION

Sets the print starting position to the specified number of dots (up to the right margin) from the beginning of the line. The print starting position is reset to the first column after each line.

ASCII	ESC	$	nL	nH
Hexadecimal	**1B**	**24**	**nL**	**nH**
Decimal	27	36	nL	nH

Value of n: *n* = Number of dots to be moved from the beginning of the line.
nL = Remainder after dividing *n* by 256
nH = Integer after dividing *n* by 256
The values for *nL* and *nH* are two bytes in low byte, high byte word orientation :
((nH * 256) + nL).

Note: Where nL is a multiple of 4.

Formulas: The example shows how to calculate 280 dots as the absolute starting position :
280/256 = 1, remainder of 24 *nL* = 24 *nH* = 1

SET HORIZONTAL TAB POSITIONS

Sets up to 32 horizontal tab-position *n* columns from column one, but does not move the print position. See the Horizontal Tab command (09).
The tab positions remain unchanged if the character widths are changed after the tabs are set. The command ends with hexadecimal 00; hexadecimal 1B 44 00 clears all tabs.

The tabs cannot be set higher than the column width of the current pitch:

ASCII	ESC D [*n*]...*k* NUL
Hexadecimal	**1B 44 [*n*]…*k* NUL**
Decimal	27 68 [*n*]...*k* 0
Value of *n*	Column number for tab minus one (*n* is always less than or equal to the current selected column width)
Value of *k*	0-32
Default	Every 8 characters from column. 1 (9, 17, etc.) for normal print

Formulas
Set the tab positions in ascending order and put Hex 00 at the end.
Hex 1B 44 00 (number of tabs not specified) clears all tab positions.

Example:
1B 44 03 04 07 0A 0D 18 00
09 41 09 42 09 43 09 44 09 45 09 46 0A

To obtain (in standard pitch): ---A---B--C--D----------EF

SET RELATIVE PRINT POSITION

Moves the print-starting position the specified number of dots either right (up to the right margin) or left (up to the left margin) of the current position.
The print starting position is reset to the first column after each line.
Any setting that exceeds the printable area is ignored.

ASCII	ESC \ *nL nH*
Hexadecimal	**1B 5C *nL nH***
Decimal	27 92 *nL nH*

Value of *n*

To Move the Relative Starting Position Right of the Current Position:
n = Number of dots to be moved right of the current position
nL = Remainder after dividing *n* by 256
nH = Integer after dividing *n* by 256
The values for *nL* and *nH* are two bytes in low byte, high byte word orientation.

To Move the Relative Starting-Position Left of the Current Position:
n = Number of dots to be moved left of the current position
nL = Remainder after dividing (65536-*n*) by 256
nH = Integer after dividing (65536-*n*) by 256
The values for *nL* and *nH* are two bytes in low byte, high byte word orientation.

Note: where *nL* is a multiple of 4.

Formulas
To move to the left:
The example shows how to set the relative position 20 dots to the left of the current position.
65536-20 = 65516
65516/256 = 255, remainder of 236
nL = 236, *nH* = 255

To move to the right:
The example shows how to set the relative position 260 dots to the right of the current position.
260/256 = 1, remainder of 4
nL = 04, *nH* = 01

SELECT JUSTIFICATION

Specifies the alignment of characters, logos, and bar codes (see the value of *n* table).

ASCII	ESC a *n*
Hexadecimal	**1B 61 *n***
Decimal	27 97 *n*
Value of *n*	0, 48 = Left aligned 1, 49 = Center aligned 2, 50 = Right aligned
Range of *n*	0-2, 48-50
Default	0 (Left aligned)

Exceptions
The command is valid only at the beginning of a line.

SET LEFT MARGIN

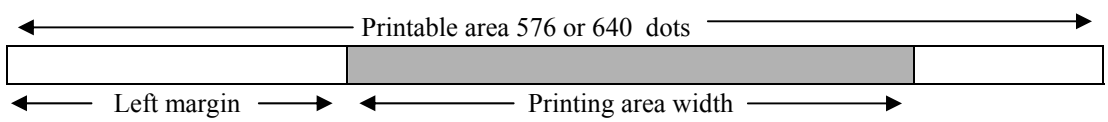
Sets the left margin of the printing area. The left margin is set to ((*nH* X 256) + *nL*) dots.
The Set Printing Area Width command (1D 57), sets the width of the printing area. See the Set Printing Area Width command (1D 57) in this document for a description of that command.

ASCII	GS L *nL nH*
Hexadecimal	**1D 4C *nL nH***
Decimal	29 76 *nL nH*
Range of *nL*	0-255
Range of *nH*	0-255
Default	576 (80mm mode) 640 (82.5mm mode)
Note:	If the setting exceeds the printable area, the maximum value of the printable area is used. The maximum printable area is 576 or 640. See the illustration. The command is ignored if it is not at the beginning of the line. Where *nL* is a multiple of 4.

Formulas
To set the left margin to one inch, send the four-byte string: GS L 203 0

Or, to set the left margin to two inches, send the four-byte string: GS L 150 1

Where 2 inches = 406/203, and 406 = (1 X 256) + 150.



SET PRINTING AREA WIDTH

The width of the printing area is set to n dots.
If the setting exceeds the printable area, the maximum value of the printable area is used.
The width of the printing area follows the Set Left Margin command (1D 4C).
See the Set Left Margin command (GS L) earlier in this document for a description.

ASCII	GS W *nL nH*
Hexadecimal	**1D 57 *nL nH***
Decimal	29 87 *nL nH*

Operand: n = ((nH * 256) + nL) dots

Range of *nL*	0-255
Range of *nH*	0-255

Limits :

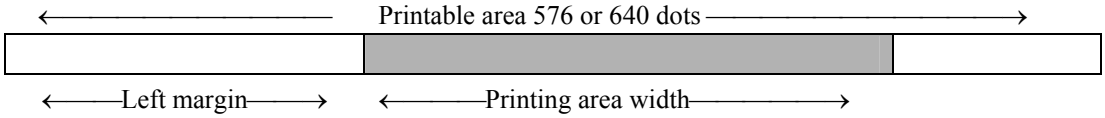
Default 80.0mm mechanism :	576 dots (the maximum printable area)
Default 82.5mm mechanism :	640 dots (the maximum printable area)

Notes: The command is ignored if it is not at the beginning of the line.
If the setting exceeds the printable area, the maximum value of the printable area is used.
Where nL is a multiple of 4.
Minimum print area width = 4.

Formulas
To set the width of the printing area to one inch, send the four-byte string: GS W 203 0

Or, to set the width of the printing area to two inches, send the four-byte string: GS W 150 1

Where 2 inches = 406/203, and 406 = (1 X 256) + 150.



12.6 ***Print characteristics commands***

These commands control what the printed information looks like, selection of character sets, and setting of margins. The commands are described in order of their hexadecimal codes.

SELECT PRINT MODE

Selects the print mode: standard, compressed, underlined, double high or double wide.

ASCII ESC ! *n*
Hexadecimal **1B 21 *n***
Decimal 27 33 *n*

Value of *n:* See table

Value of *n*

Bit[1]	**Function**	**0**	**1**
Bit 4	Double High	Canceled	Set
Bit 5	Double Wide	Canceled	Set
Bit 7	Underlined Mode	Canceled	Set (bar thickness = 2)

[1] Bits 0,1,2,3 and 6 are not used

Default 0 (for bits 4, 5, 7)

SELECT OR CANCEL UNDERLINE MODE

Turns underline mode on or off. Underlines cannot be printed for spaces set by the Horizontal Tab, Set Absolute Start Position, Set Relative Print Position commands, or in white/black reverse print mode.
Underline mode may also be turned ON and OFF with the Select Print Mode(s) command (1B 21).

ASCII	ESC	-	n
Hexadecimal	**1B**	**2D**	**n**
Decimal	27	45	n

Value of *n:*

0-48 =	Cancel underline mode
1-49 =	Select underline mode and bar thickness = 2
2-50 =	
Default:	0-48

SELECT OR CANCEL WHITE/BLACK REVERSE PRINT MODE

In White/Black reverse printing mode, print dots and non-print dots are reversed, which means that white characters are printed on a black background. When the White/Black reverse printing mode is selected it is also applied to character spacing which is set by Right-Side Character Spacing (ESC SP).
This command can be used with built-in characters and user-defined characters, but does not affect the space between lines.
White/Black Reverse Print Mode does not affect graphics, logos, bar code, HRI characters, and spacing skipped by Horizontal Tab (HT), Set Absolute Starting Position (ESC $), and Set Relative Print Position (ESC \).

ASCII	GS B *n*
Hexadecimal	**1D 42 *n***
Decimal	29 66 *n*

Operand:	n = mode selection:
Value of *n*	0 = Off
	1 = On
Default	0 (Off)

Exceptions
Only the lowest bit of *n* is valid.

12.7 ***Font commands***

SELECT INTERNATIONAL CHARACTER SET

Selects the character set mapping to be used or selected the flash user single bytes fonts. See Table below.

ASCII	ESC R *n*
Hexadecimal	**1B 52 *n***
Decimal	27 82 *n*
Operand:	N = MODE SELECTION
Limits :	0 - 10

Default n = 0

n	**Country**
0	USA
1	France
2	Germany
3	UK
4	Denmark I
5	Sweden
6	Italy
7	Spain
8	Japan
9	Norway
10	Denmark II

Additional codes

	n	**35_D 23_H**	**36_D 24_H**	**64_D 40_H**	**91_D $5B_H$**	**92_D $5C_H$**	**93_D $5D_H$**	**94_D $5E_H$**	**96_D 60_H**	**123_D $7B_H$**	**124_D $7C_H$**	**125_D $7D_H$**	**126_D $7E_H$**
U.S.A.	0	#	$	@	[	\	]	^	`	{	¦	}	~
France	1	#	$	à	°	ç	§	^	`	é	ù	è	"
Germany	2	#	$	§	Ä	Ö	Ü	^	`	ä	ö	ü	ß
U.K.	3	£	$	@	[	\	]	^	`	{	¦	}	~
Denmark I	4	#	$	@	Æ	Ø	Å	^	`	æ	ø	å	~
Sweden	5	#	¤	É	Ä	Ö	Å	Ü	é	ä	ö	å	ü
Italy	6	#	$	@	°	\	é	^	ù	à	ò	è	i
Spain	7	Pt	$	@	i	Ñ	¿	^	`	"	ñ	}	~
Japan	8	#	$	@	[	¥	]	^	`	{	¦	}	~
Norway	9	#	¤	É	Æ	Ø	Å	Ü	é	æ	ø	å	ü
Denmark II	10	#	$	E	Æ	Ø	Å	Ü	é	æ	ø	å	ü

SELECT CHARACTER CODE TABLE OR ACTIVE USER-DEFINED FONT SELECTION

Selects the character set to be used.

ASCII	ESC t *n*
Hexadecimal	**1B 74 *n***
Decimal	27 116 *n*
Operand:	n = mode selection

Limits :

"ESC R" OPERAND DEFINITION		
N		
Decimal	**Hex**	**Code Page**
0	00	437 : US
6	06	858 : Multilingual with Euro
48	30	EasyFont Storage n°00
49	31	EasyFont Storage n°01
50	32	EasyFont Storage n°02
51	33	EasyFont Storage n°03

Default 6 (Code Page 858), selectable through configuration command

READ FONT INFORMATION

If selected font exists, this command returns ACK followed by font information.
Else it returns NAK.

ASCII	FS	F	t
Hexadecimal	**1C**	**46**	**t**
Decimal	28	70	t

Operand: t = Font Id

Value of t:	48	0x30 (ASCII *n* = 0)	EasyFont n°00
	49	0x31 (ASCII *n* = 1)	EasyFont n°01
	50	0x32 (ASCII *n* = 2)	EasyFont n°02
	51	0x33 (ASCII *n* = 3)	EasyFont n°03

Returns:	OK	ACK (Hex = 06)	1 byte
		Font Id	1 byte
		Font Name	8 bytes
		Font width	1 byte
		Font Height	1 byte
		Number of characters	2 bytes < LSB , MSB>
		Checksum (Hex)	2 bytes < LSB , MSB>

Fault	NAK (Hex = 15)	1 Byte

CHECK EASYFONT COMPATIBILITY

This command asks the printer whether it supports or not Font download.
If it does, it also returns the list of available font Ids (single byte, double byte) that can be used to download a font.

ASCII	FS	H
Hexadecimal	**1C**	**48**
Decimal	28	72

Returns ASCII:	OK	ACK + list of available font Ids + 00
	Fault	NAK
Returns Hex:	OK	06 + list of available font Ids + 00
	Fault	15

DOWNLOAD SINGLE BYTE FONT

This command will download a single byte font code page to the printer.
If the download is successful, an ACK will be returned.
If unsuccessful, a NAK will be returned. A font must always be downloaded completely, which corresponds to 224 characters.
The font name is used to identify the font. It will be printed on the diagnostics or configuration form. When a downloaded font is to be deleted, the font name is used to identify the font. Two fonts cannot have the same name.
Each character is downloaded as raster, from top to bottom, and for each raster, from leftmost byte to rightmost byte.
Two fonts cannot have the same storage Id.

ASCII	FS	L	f8	t	*w*	*h*	{d}
Hexadecimal	**1C**	**4C**	***F8***	***t***	***w***	***h***	***{d}***
Decimal	28	76	*F8*	*t*	*w*	*h*	*{d}*

Operands:

- f8 = 8 character font name.
- t = Font storage Id.
- w = Font character width in dots, including inter-character space.
- H = Font character height in dots, not including inter-line space.
- d = downloaded data bytes.

Limit Hex:

- 0x20 ≤ f8 ≤ 0x7F.
- 0x30 ≤ t ≤ 0x33.
- 0x01 ≤ w, h ≤ 0x20.
- 0x00 ≤ d ≤ 0xFF.

Returns :	**OK**	**Fault**
ASCII	ACK	NAK
Hexadecimal	**06**	**15**
Decimal	6	21

Notes: See commands 1Bh 74h n .

12.8 Graphics commands

These commands are used to enter and print graphics data and are described in order of their hexadecimal codes.

PRINT RASTER GRAPHICS

Prints one row of data. *n*1 ... *n*72: bytes describing the line to print nX=72 ➔ 80.0mm.
Prints one row of data. *n*1 ... *n*80: bytes describing the line to print nX=80 ➔ 82.5mm.

ASCII	DC1	n…nX
Hexadecimal	**11**	**n…nX**
Decimal	17	n1…nX

Value of n:	n1…n72 = Data bytes 80.0mm
	n1…n80 = Data bytes 82.5mm
Range:	0 – 255
Note :	See command 1F 03 08 n Set Paper Width or diagnostic form Option Paper Width.

12.9 ***Logo commands***

SELECT THE CURRENT LOGO

Selects a logo to be defined or printed. The active logo *n* remains in use until this command is sent again with a different logo *n*, or command 1B40 is sent or printer reboots.

When this command precedes a logo definition, that definition is stored in flash memory as logo *n*. if there is already a different definition in flash memory for logo *n*, the first is inactivated and the new definition is used. The inactive definition is not erased from flash and continues to take up space in flash memory.

When this command precedes a logo print command and *n* is different from the previously active logo selected, the printer retrieves the logo definition for *n* from memory and prints it. If there is no definition for logo *n*, then no logo is printed.

ASCII	GS # *n*	
Hexadecimal	**1D 23 *n***	
Decimal	29 35 *n*	
Operand:	n	= mode selection
Range of *n*	0 – 63	

Note: An application using multiple logos, into flash memory, is responsible for erasing the flash memory page when the logo area is full.

DEFINE DOWNLOADED BIT IMAGE IN FLASH MEMORY

Enters a downloaded bit image (such as a logo) into Flash with the number of dots specified by *n*1 and *n*2.
The downloaded bit image is available until another bit image is defined, or either Initialize Printer (1B 40 or 1D 40 n), command is received.

ASCII	GS	*	*n1*	*n2*	*d1…dn*
Hexadecimal	**1D**	**2A**	**n1**	**n2**	**d1…dn**
Decimal	29	42	*n1*	*n2*	*d1…dn*

Operands:	**Value of *n*1**	**Value of *n*2**	**Value of *d***
	1-80 (8 x *n*1 = Number of Horizontal Dot Columns)	1-255 (Number of Vertical Bytes)[1]	Bytes of Data (Printed Down, Then Across)

[1]The number of bytes sent is represented by the following formula:

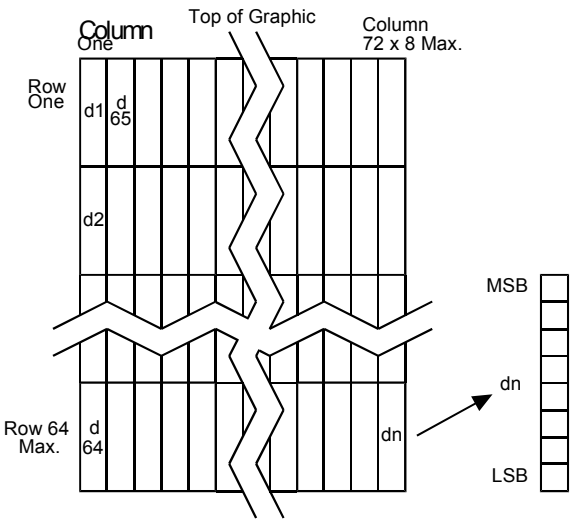
n = 8 x *n*1 x *n*2 (*n*1 x *n*2 must be less than or equal to 49138 < Size User Flash memory).

See the illustration below for a graphic representation of the downloaded bit image :

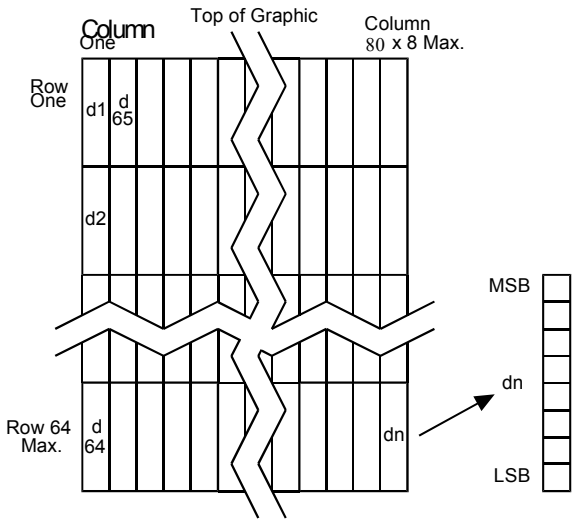
Return :	**OK**	**Fault**
ASCII	ACK	NAK
Hexadecimal	**06**	**15**
Decimal	6	21

Note: See the illustration for the Print Downloaded Bit Image command (1D 2F) for a representation of the bit image.

80 mm paper



82.5 mm paper



PRINT DOWNLOADED BIT IMAGE

Prints the downloaded bit image at a density specified by *m*. It is ignored if any data is in the print buffer, if the downloaded bit image is undefined.

ASCII	GS / *m*
Hexadecimal	**1D 2F *m***
Decimal	29 47 *m*

Value and Range of *m*

Value of *m*	Print Mode	Vertical DPI[1]	Horizontal DPI*
0	Normal	203	203
1	Double Wide	203	101
2	Double High	101	203
3	Quadruple	101	101

[1]Dot density measured in dots per inch

Note: See the illustration on the previous page for a representation of the bit image (1D 2A).

RETURN LOGO CHECKSUM

Returns the checksum of a logo downloaded in flash memory (see command 1D 2A…)
Reply 4 bytes [Command ID + Flag + checksum of the logo] specified by n.
Checksum is two's complement of sum of **all** bytes in the download sequence.

ASCII	US	V	*n*
Hexadecimal	**1F**	**65**	**n**
Decimal	31	101	*n*

Operand: n = Selected logo

Limit : Dec: 0 < n < 63
Hex: 0 < n < 3F

Return : 4 Bytes :

Format	Byte 1	= 65 (Hex) = Command ID	
	Byte 2	= 01 (Hex) = Logo present	= 00 (Hex) = Logo absent
	Byte 3	= Checksum (LSB)	= 00 (Hex)
	Byte 4	= Checksum (MSB)	= 00 (Hex)

Note : If n is out of range, no reply command.

Example: Checksum = **-** (0x1D + 0x2A + …) For the "Define Downloaded Bit Image" command.

12.10 *Printer status commands*

These commands enable the printer to communicate with the host computer. They are stored in the printer's data buffer as they are received, and are handled by the firmware in the order in which they were received.

When a fault occurs, the printer will go busy at the communication interface and not respond to either of the Printer Status commands. If the fault causing the busy condition can be cleared, such as by loading paper, or letting the thermal print head cool down, the printer will resume processing the data in its receive buffer.

Real Time commands allow the printer to respond immediately, even though it is busy at the communication interface. See the following section, Real Time Commands, for details about these commands.

TRANSMIT PAPER SENSOR STATUS

The printer sends one byte to the host computer when it is not busy or in a fault condition.

ASCII	ESC *v*
Hexadecimal	**1B 76**
Decimal	27 118

Values

Status Byte

Bit	**Function**	**0**	**1**
0	Receipt Paper	Present	Out
1	Receipt Cover	Closed	Open
2	Receipt Paper	Present	Out
3	Knife Position	Home Position	Not Home Position
4	Not Used	Fixed to Zero	Fixed to Zero
5	Temperature	In valid range	Too hot or too cold
6	Voltage	In valid range	Too high or too low
7	Not Used	Fixed to Zero	Fixed to Zero

Related Information: If Paper Low sensor Option disabled ➔ Paper low Sensor = Paper empty sensor.
See Busy Line and Fault Conditions in the Real Time Commands section of this document for details about fault condition reporting.

RETURN SRAM SIZE

Returns the size of SRAM on board, on one byte as number of 64 Kbytes sectors.

ASCII	GS BS
Hexadecimal	**1D 08**
Decimal	29 08

Return:	1 byte =	**SRAM sizes**
Values (Dec)	6 kb (internal RAM only)	= 0
	128 kb (w/extension)	= 2

RETURN HARDWARE INFORMATION

Sends status data to the host computer.
The printer sends one byte to the host computer when it is not busy or in a fault condition.

ASCII	GS
Hexadecimal	**1D 0A**
Decimal	27 118

Returns: 1 byte = Status Byte reply

Values

Status Byte

Bit	Function	0	1
0	Last NVRAM program	OK	Failure
1	Head connector (s)	OK	Failure
2	Not Used	Fixed to Zero	Fixed to Zero
3	Not Used	Fixed to Zero	Fixed to Zero
4	Not Used	Fixed to Zero	Fixed to Zero
5	Not Used	Fixed to Zero	Fixed to Zero
6	Not Used	Fixed to Zero	Fixed to Zero
7	Power fail	No	Yes

Note: Last NVRAM program bit 0: Reset each write NVRAM command.
Power fail bit 7: after first read go to zero.
Purge data USB bit 6: after read go to zero.

TRANSMIT PRINTER ID

Transmits the printer model, type of version as defined below. This command is processed as normal printer data.

ASCII GS I *n*
Hexadecimal **1D 49 *n***
Decimal 29 73 *n*

Operand: *n* = printer ID select
Limit: Decimal: $1 \le n \le 2$; $49 \le n \le 50$; $n = 66,67,68$
Hex: $01 \le n \le 02$; $31 \le n \le 32$; $n = 42,43,44$

"GS I" OPERAND AND RETURNED STATUS DEFINITION						
n		Printer ID	Function		Value	
Decimal	Hex				Decimal	Hex
1, 49	01, 31	Model	COMPACT		50	32
2, 50	02, 32	Type	Bit	Function	Value	
					0	1
			0	2-byte character code	Not installed	Installed
			1	Knife	No knife	Installed
			2	Undefined		
			3	Undefined		
			4	Fixed	Always 0	-
			5	Undefined		
			6	Undefined		
			7	Fixed	Always 0	-
66	42	Manufacturer	_AXIOHM			
67	43	Printer name	_COMPACT			
68	44	Serial number	Depends on actual S/N			

Note:
For n = 66, 67, 68 the printer response is sent back in the following format.

Header: 5F (hex)
Data: ASCII string
NULL: 00 (hex)

TRANSMIT PRINTER ID, REMOTE DIAGNOSTICS EXTENSION

Performs functions specified by *n (Refer to table)*.

ASCII	GS I @ *n*
Hexadecimal	**1D 49 40 *n***
Decimal	29 73 64 *n*

Operand:	**n**	mode selection	
Values of n:		Refer to table below	
Return format:	n	+ data	+<CR>

Value of *n*		**Remote diagnostic item**		**Function**
Hex	**Dec**			
20	32	Serial #, 10 digit ASCII	*	Write to NVRAM Example, send 14 bytes to printer: GS I @ 0x20 1234567890
23	35	Serial #		Return Serial #, preceded by *n* to identify Printer returns 12 bytes in above example: #1234567890<CR>
24	36	Class/model #, 15 digit ASCII	*	Write to NVRAM
27	39	Class/model #		Return Class/model #, returns 17 bytes
2F	47	Boot firmware CRC, 4 digit ASCII		Return Boot firmware CRC, returns 6 bytes
37	55	Flash firmware CRC, 4 digit ASCII		Return Flash firmware CRC, returns 6 bytes
97	151	Boot firmware version		Return Boot firmware version, returns 6 bytes
A3	163	Flash firmware version		Return Flash firmware version, returns 6 bytes

***** 0x20 ≤ digit ≤ 0x79

Exception: If any digit is out of the defined range, Write to NVRAM is ignored.

VOLTAGE AND TEMPERATURE MONITORING

Returns the result of latest voltage and temperature measurement.

ASCII	GS	l	*m*
Hexadecimal	**1D**	**6C**	**m**
Decimal	29	108	*m*

Operand:	m	= Selected channel :
Value of *m*	0x08	= Read Voltage
	0x09	= Read Temperature
Returns:		1 Byte , see below

- ***m* = 0x08 :**

Formulas: Returns raw A/D conversion on 1 byte. Actual voltage is defined with formula :
Voltage (V) = 0.11274 x reading

Example: reading = *213* ➔ Voltage = *24.01V*
reading = *186* ➔ Voltage = *21.00V*

- ***m* = 0x09 :**

Formulas: Returns raw A/D conversion on 1 byte. Actual temperature is defined with formulas :
Rthermistor (kOhm) = 100 / ((255 / reading) - 1)
Temp (°C) = (3950 / (ln (Rthermistor / 30) + 13.255)) - 273

Example: reading = 60 ➔ RTH= 30.769ko ➔ Temperature = 24.43°C
reading = 27 ➔ RTH=11.842ko ➔ Temperature = 47.47°C

TRANSMIT STATUS (PAPER SENSOR STATUS, DRAWER KICK OUT STATUS, FLASH MEMORY USER SECTOR STATUS)

Transmits the status specified by *n*.

This is a batch mode command which transmits the response after all prior data in the receive buffer has been processed.

There may be a time lag between the printer receiving this command and transmitting the response, depending on the receive buffer status.

ASCII	GS	1	*n*
Hexadecimal	**1D**	**72**	**n**
Decimal	29	114	*n*

Operand: n = Mode selection

Value of n
- 1, 49 = Paper sensor Status
- 2, 50 = Drawer Kick out Status
- 4, 52 = Flash memory User Sector status

Returns: 1 Byte. The status bytes to be transmitted are described in the following tables:

Note: If Paper Low sensor Option disabled ➔ Paper low Sensor = Paper empty sensor.

When *n* is out of the specified range, the command is ignored.

Paper sensor Status (*n* = 1 or *n* = 49)

Bit	Off/On	Hex	Decimal	Status for Transmit Status
0	Off	00	0	Paper Low : Paper Present
	On	01	1	Paper Low : Paper exhausted
1	Off	00	0	Cover Closed
	On	02	2	Cover Open
2	Off	00	0	Paper End : Paper Present
	On	04	4	Paper End : Paper exhausted
3	-	-	-	Undefined
4	Off	00	0	Not used. Fixed to off.
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to off.

Drawer Kick out Status (*n* = 2 or *n* = 50)

Bit	Off/On	Hex	Decimal	Status for Transmit Status
0	Off	00	0	Pin Low
	On	01	1	Pin High
1	-	-	-	Undefined
2	-	-	-	Undefined
3	-	-	-	Undefined
4	Off	00	0	Not used. Fixed to off.
5	-	-	-	Undefined
6	-	-	-	Undefined
7	Off	00	0	Not used. Fixed to off.

Flash memory User Sector Status (*n* = 4 or *n* = 52)

Bit	Off/On	Hex	Decimal	Status for Transmit Status
0	-	-	-	Undefined.
1	-	-	-	Undefined.
2	Off	00	0	Not Used. Fixed to off
3	Off	00	0	Logo(s) defined.
	On	08	8	No logo defined.
4	Off	00	0	Not used. Fixed to off.
5	Off	00	0	No user-defined characters written to flash.
	On	20	32	User-defined characters written to flash
6	Off	00	0	Not used. Fixed to off.
7	-	-	-	Undefined.

SEND PRINTER SOFTWARE VERSION

The printer returns 8 bytes containing the boot and flash software version.
The first 4 bytes returned are an ASCII string for the boot version.
The second 4 bytes are an ASCII string for the flash version.

ASCII	US V
Hexadecimal	**1F 56**
Decimal	31 86

Return : 8 bytes ASCII

Example: the printer returns 1.07 1.15
This means the boot version is 1.07 and the flash version is 1.15.

BUFFERED STATUS TRANSMISSION (ERROR STATUS, SENSOR STATUS)

Returns the selected status when this command is processed as normal printer data.

ASCII	US	v	*n*
Hexadecimal	**1F**	**76**	**n**
Decimal	31	118	*n*

Operand: n = Status select
2 = Error Status
4 = Sensor Status

Limit Dec: n= 2 n= 4
Hex: n= 02 n= 04

Return : 1 Byte See Table below.

Note: (1) n= 2 = Error Status ➔ bit 5 is set when black mark is not detected (when TOF mode is activated). Bit is reset at each TOF new search.

(2) n= 4 = Sensor Status ➔ Bit 5 is set when TOF mode is activated (paper end senor is used as TOF sensor)

"US v" RETURNED STATUS DEFINITION n = 2: ERROR STATUS			
		Value	
Bit	**Function**	**0**	**1**
0	Reserved	-	-
1	Reserved	-	-
2	Reserved	-	- (1)
3	Reserved	-	-
4	Fixed	Always 0	-
5	Top Of Form search (Black Mark Detected)	OK	Failure
6	Reserved	-	-
7	Fixed	Always 0	-

"US v" RETURNED STATUS DEFINITION n = 4: SENSOR STATUS			
		Value	
Bit	**Function**	**0**	**1**
0	Reserved	-	-
1	Sensor see Black Mark	No	Yes
2	Reserved	-	-
3	Reserved	-	-
4	Fixed	Always 0	-
5	Mode TOF in progress (2)	No	Yes
6	Reserved	-	-
7	Fixed	Always 0	-

12.11 Real time commands

The Real Time commands provide an application interface to the printer even when the printer is not handling other commands.

- Real Time Status Transmission: DLE (Hex 10) Sequence
- Real Time Request to Printer: DLE (Hex 10) Sequence
- Real Time Printer Status Transmission

The original Printer Status commands, Transmit Printer Status (Hex 1B 76, ASCII ESC v) are placed in the printer's data buffer as they are received and handled by the firmware in the order in which they were received. If the paper exhausts while printing data that was in the buffer ahead of the status command, the printer goes busy at the communication interface and suspends processing the data in the buffer until paper is reloaded. This is true for all error conditions: knife home error, thermal print head overheating, etc. In addition, there is no way to restart the printer after a paper jam or other error.

The Real Time commands are provided to overcome these restrictions.

RULES FOR USING REAL TIME COMMANDS

Three situations must be understood when using real time commands:

1) The printer executes the Real Time command upon receiving it and will transmit status regardless of the condition of the host being ready to receive or not.

2) The printer transmits status whenever it recognizes a Real Time Status Transmission command sequence, even if that sequence happens to occur naturally within the data of another command, such as graphics data.
In this case the sequence will be processed both ways: as a real time command and as the graphics data it is intended to be when the graphics command is executed from the buffer. The result is that the host might receive status messages it has not requested.

3) If the printer is in error condition, meaning that the communication interface is likely to be busy, the host must be able to send the real time commands regardless of this busy state at the interface. Otherwise those commands wouldn't be received and processed.

MOVING DATA THROUGH THE BUFFER

Applications should not let the buffer fill up with Real Time commands when the printer is busy at the communication interface. A busy condition can be determined by bit 3 of the response to DLE EOT 1. Other responses to DLE EOT n can determine the reason for a particular busy condition.

Although the printer responds to Real Time commands when it is busy, it will place them into the buffer behind any other data there, and flush them out in the order in which they were received. When the printer is busy due simply to buffer full (that is, it can't print data as fast as it can receive it), then data continues to be processed out of the buffer at approximately print speed and the Real Time commands will eventually get flushed out.

When the printer is busy due to an error condition, then data stops being processed of the buffer until the condition clears one way or another. In either case, but more quickly in the case of an error condition, the buffer can fill with Real Time commands.

To guard against this situation, the application must determine the cause of a busy condition and take appropriate action or pace the Real Time commands to avoid filling the buffer. There is a minimum of 256 bytes available in the printer's buffer when it goes busy.

BUSY LINE AND FAULT CONDITIONS

If the printer is in error condition (cover is open, paper is exhausted…), the printer will go busy immediately. Then it will stay busy and stop processing data out of the receive buffer until the condition clears. It will respond to the Real Time commands as described below.

REAL TIME STATUS TRANSMISSION

Transmits the selected one byte printer status specified by *n* in Real Time according to the following parameters.

	DLE Sequence
ASCII	DLE EOT *n*
Hexadecimal	**10 04 *n***
Decimal	16 4 *n*

	DLE Sequence
Value of *n*	1 = Transmit printer status
	2 = Transmit communication interface busy status
	3 = Transmit error status
	4 = Transmit receipt paper status

Exceptions
The command is ignored if *n* is out of range.

Related Information

1 = Transmit Printer Status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to Off.
1	On	02	2	Fixed to On.
2	On	04	4	Fixed to On.
3	Off On	00 08	0 8	Not busy at the communication interface. Printer is Busy at the communication interface.
4	On	10	16	Fixed to On.
5	On	40	32	Data received in buffer
	Off	00	0	Buffer empty
6				Undefined.
7	Off	00	0	Fixed to Off.

2 = Transmit communication interface Busy Status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to Off.
1	On	02	2	Fixed to On.
2	Off On	00 04	0 4	Cover closed. Cover open.
3	Off On	00 08	0 8	Paper feed button is not pressed. Paper feed button is pressed.
4	On	10	16	Fixed to On.
5	Off On	00 20	0 32	Printing not stopped due to paper condition. Printing stopped due to paper condition.
6	Off On	00 40	0 64	No error condition. Error condition exists in the printer.
7	Off	00	0	Fixed to Off.

3 = Transmit Error Status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to Off.
1	On	02	2	Fixed to On.
2	Off	00	0	Fixed to Off.
3	Off	00	0	No knife error.
	On	08	8	Knife error occurred.
4	On	10	16	Fixed to On.
5	Off	00	0	No unrecoverable error.
	On	20	32	Unrecoverable error occurred.
6	Off	00	0	Thermal print head temp. and power supply voltage are in range.
	On	40	64	Thermal print head temp. or power supply voltage are out of range.
7	Off	00	0	Fixed to Off

4 = Transmit Receipt Paper Status

Bit	Status	Hex	Decimal	Function
0	Off	00	0	Fixed to Off
1	On	02	2	Fixed to On
2	Off	00	0	Paper adequate
	On	04	4	Paper low (if paper low sensor enabled)
3	Off	00	0	Paper adequate
	On	08	8	Paper low (if paper low sensor enabled)
4	On	10	16	Fixed to On
5	Off	00	0	Paper present
	On	20	32	Paper exhausted
6	Off	00	0	Paper present (optional 2nd paper out sensor)
	On	40	64	Paper exhausted
7	Off	00	0	Fixed to Off

REAL TIME RECOVERY FROM FAULT

When the printer is an error status, this command clearing the data in the receive buffer and print buffer

ASCII	DLE	ENQ	n
Hexadecimal	**10**	**05**	**n**
Decimal	16	5	n

Operand: n = Recovery mode

Limit Dec: n = 2
Hex: n = 02

Notes: This command will attempt recovery from any fault that prevents printing including jams and paper out.

Recovering from a print head over temperature condition is only accomplished by waiting until the print head has returned to its operating temperature range.

This command will be ignored until manual intervention has occurred to clear the fault condition. The indication of manual intervention for clearing paper out, paper jams, cutter fault consists of opening and closing the clamshell.

12.12 Bar code commands

These commands format and print bar codes, and are described in order of their hexadecimal codes.

SELECT PRINTING POSITION OF HRI CHARACTERS

Prints HRI (Human Readable Interface) characters above or below the bar code.

ASCII	GS H *n*
Hexadecimal	**1D 48 *n***
Decimal	29 72 *n*

Value of *n* Printing position

0 = Not printed
1 = Above the bar code
2 = Below the bar code
3 = Both above and below the bar code

Default 0 (Not printed)

SELECT BAR CODE HEIGHT

Sets the bar code height to *n* dots or *n*/203 inch (*n*/8 mm).

ASCII	GS h *n*
Hexadecimal	**1D 68 *n***
Decimal	29 104 *n*

Operand:	n = Number of dots
Limits:	1≤ n ≤ 255
Default	= 216 dots

PRINT BAR CODE (FIRST & SECOND VARIATION)

There are two variations to this command.

The first variation uses a NULL character to terminate the string; the second uses a length byte at the beginning of the string to compensate for the Code 128 bar code that can accept a NULL character as part of the data.

With the second variation the length of byte is specified at the beginning of the string.

Bar codes can be aligned left, center, or right using the Align Positions command (1B 61).

The check digit is calculated for UPC and JAN (EAN) codes if it is not sent from the host computer.

Six-character zero-suppressed UPC-E tags are generated from full 11 or 12 characters sent from the host computer according to standard UPC-E rules.

Start/Stop characters are added for Code 39 if they are not included.

	First Variation					Second Variation				
ASCII	GS	k	*m*	*d1…dk*	*NUL*	GS	k	*m*	*n*	*d1…dk*
Hexadecimal	**1D**	**6B**	m	**d1…dk**	**00**	**1D**	**6B**	m	**n**	**d1…dk**
Decimal	29	107	*m*	*d1…dk*	*0*	29	107	*m*	*n*	*d1…dk*
	(0 = End of command)									

Operands: See tables below.

Exceptions: The command is only valid at the beginning of a line.

Illegal data cancels the command.

If the width of the bar code exceeds one line, the bar code is not printed.

First Variation: Data string terminated with NULL Character

Description: The value of *m* selects the bar code system as described in the table.

The variable *d* indicates the character code to be encoded into the specified bar code system. See the table.

Exceptions: If character code *d* cannot be encoded, the printer prints the bar code data processed so far, and the following data is treated as normal data.

m	Bar Code	d	n, Length
0	UPC-A	48- 57 (ASCII numerals)	Fixed Length: 11, 12
1	UPC-E	48- 57	Fixed Length: 11, 12
2	JAN13 (EAN)	48- 57	Fixed Length: 12, 13
3	JAN8 (EAN)	48- 57	Fixed Length: 7,8
4	Code 39	48- 57, 65- 90 (ASCII alphabet), 32, 36, 37, 43, 45, 46, 47 (ASCII special characters) d1 = dk = 42 (start/stop code is supplied by printer if necessary)	Variable Length
5	Interleaved 2 of 5	48- 57	Variable Length (Even Number)

Second Variation: Length of Byte Specified at Beginning of String

Description: The value of *m* selects the bar code system as described in the table.

The variable *d* indicates the character code to be encoded into the specified bar code system. See the table.

Exceptions: If character code *d* cannot be encoded, the printer prints the bar code data processed so far, and the following data is treated as normal data.

m	Bar Code	d	n, Length
65	UPC-A	48- 57 (ASCII numerals)	Fixed Length: 11, 12
66	UPC-E	48- 57	Fixed Length: 11, 12
67	JAN13 (EAN)	48- 57	Fixed Length: 12, 13
68	JAN8 (EAN)	48- 57	Fixed Length: 7, 8
69	CODE39	48- 57, 65- 90 (ASCII alphabet), 32, 36, 37, 43, 45, 46, 47 (ASCII special characters) *d1* = *dk* = 42 (start/stop code is supplied by printer if necessary)	Variable
70	Interleaved 2 of 5 (ITF)	48- 57	Variable (Even Number)
73	Code 128	0-105 *d1* = 103-105 (must be a Start code) *d2* = 0-102 (data bytes) (Stop code is provided by the printer)	Variable

SELECT BAR CODE WIDTH

Sets the bar code module to *n*/203 inch (*n*/8 mm).

ASCII GS w *n*
Hexadecimal **1D 77 *n***
Decimal 29 119 *n*

Operand: n
Range 1 ,2, 3, 4, 5,6
Default 3
Formulas *n*/203 inch (*n*/8 mm).

12.13 ***Flash firmware download commands***

These commands are used to load firmware into the printer.

There are two ways to enter the download mode.
While the printer is running normally, send the command, “Switch to Flash Download Mode (1B 5B 7D)” to leave normal operation and enter the download mode.
If the Flash if found corrupted during Level 0 diagnostics the download mode is automatically entered after the printer has reset.

The printer never goes directly from the download mode to normal printer operation. To return to normal printer operation either the operator must turn the power off and then on to reboot or the application must send a command to cancel download mode and reboot.

When each flash download command is received, the printer returns either ACK or NAK to the host computer when each command is received:
ACK (hexadecimal 06)
Sent when the printer has received a host transmission and has completed the request successfully.
NAK (hexadecimal 15)
Sent when a request is unsuccessful.
The commands are listed in numerical order according to their hexadecimal codes. Each command is described and the hexadecimal, decimal, and ASCII codes are listed.
Communicates to the printer information downloaded from applications. Data is downloaded to flash memory to query the state of the firmware, calculate the firmware CRC and other functions.

Firmware Download Sequence:

By providing a set of low-level commands, great freedom of implementation is given to customer application to customize the sequence to match its specific requirements.

Following is the description of a typical Firmware download sequence.
Only the main steps are mentioned.
Error checking and error recovery is not described:

1) Switch to Flash Download Mode

2) Check Flash Memory Size

3) Erase all Flash Memory sectors, except Boot Sector

4) Download Code to Active Flash Sector
   4.1) Select Flash memory sector #n (each sector contains 64kbytes)
      4.1.1) Program segment of N bytes
      4.1.2) if more segments, loop back to 4.1.1)
   4.2) if more sectors to program, loop back to 4.1)

5) Check Flash CRC

6) Reboot Printer

SWITCH TO FLASH DOWNLOAD MODE

Puts the printer in flash download mode in preparation to receive commands controlling the downloading of objects into flash memory.

When this command is received, the printer leaves normal operation and can no longer print transactions until the Reboot the Printer command (1D FF) is received or the printer is rebooted.

ASCII	ESC [}
Hexadecimal	**1B 5B 7D**
Decimal	27 91 125

Note: This command does not affect the current communication parameters.
Once the printer is in flash download mode, this command is no longer available.

REQUEST FLASH MEMORY SIZE

Returns the size of the flash used. There may be 2 sectors (64K each) in flash memory. This command assures that the firmware to be downloaded is the appropriate size for flash memory.

ASCII	GS SOH
Hexadecimal	**1D 01**
Decimal	29 1

The returned value corresponds to the highest sector number that can be accepted by the Select Sector to Download (1D 02 *nn*) command. :
1 = 128 Kbytes Flash

SELECT FLASH MEMORY SECTOR TO DOWNLOAD

Selects the flash sector (nn) for which the next download operation applies.
The values of the possible sector are restricted, depending upon the flash part type. The printer transmits an ACK if the sector number is acceptable or an NAK if the sector number is not acceptable. Sector numbers start at 0.

ASCII	GS	STX	nn
Hexadecimal	**1D**	**02**	**nn**
Decimal	29	2	nn

Value and range	**n :**	0	64 Kbytes Internal Flash
		1	72 Kbytes Internal Flash

Exceptions: Available only in download mode.

GET FLASH FIRMWARE CRC STATUS

Causes the printer to calculate the CRC for the Flash firmware code space and transmits the result.
This is performed normally after downloading completely a new firmware to verify that the downloaded firmware is valid
The printer transmits ACK if the calculated CRC is correct; NAK if the CRC is incorrect

ASCII	GS ACK
Hexadecimal	**1D 06**
Decimal	29 6

Returns:	**OK**	**Fault**
ASCII	ACK	NAK
Hexadecimal	**06**	**15**
Decimal	6	21

RETURN BOOT SECTOR CRC

Returns the CRC calculated over the boot sector code space.

ASCII	GS BEL
Hexadecimal	**1D 07**
Decimal	29 7

Returns:	3 byte
Values:	ACK <low byte> <high byte>

ERASE ALL FLASH CONTENTS EXCEPT BOOT SECTOR

Causes the entire flash memory to be erased.
The printer returns ACK if the command is successful; NAK if it is unsuccessful.

ASCII	GS SO
Hexadecimal	**1D 0E**
Decimal	29 14

Return value :	**OK**	**Fault**
ASCII	ACK	NAK
Hexadecimal	**06**	**15**
Decimal	6	21

Note: Available only in download mode.

RETURN MAIN PROGRAM FLASH CRC

Returns the CRC calculated over the flash firmware code space.

ASCII	GS SI		
Hexadecimal	**1D 0F**		
Decimal	29 15		
Returns:	3 bytes		
Values:	ACK	<low byte>	<high byte>

ERASE SELECTED FLASH SECTOR

Erases the previously selected sector.
The printer transmits ACK when the sector has been erased. If the previous sector is not successfully erased, or if no sector was selected, the printer transmits NAK.

ASCII	GS	DLE	n
Hexadecimal	**1D**	**10**	**n**
Decimal	29	16	n

Value and range	**n :**	0	64 Kbytes Internal Flash
		1	72 Kbytes Internal Flash
Notes:	Available only in download mode.		

DOWNLOAD TO ACTIVE FLASH SECTOR

Contains a start address (ah x 256 + al) and count (ch x 256 + cl) of binary bytes to load into the selected sector, followed by that many bytes. The start address is relative to the start of the sector. Addresses run from 0 to xxK.
The printer may return one of several responses. ACK means that the data was written correctly and the host should transmit the next block. NAK means that, for some reason, the data was not written correctly. This could mean that communications failed or that the write to flash failed. The alternatives seem to be to retry the block or halt loading and assume a hardware failure.

ASCII	GS	DC1	al	ah	cl	ch	d1…dn
Hexadecimal	**1D**	**11**	**al**	**ah**	**cl**	**ch**	**d1…dn**
Decimal	29	17	al	ah	cl	ch	d1…dn

Value of :
- al = Low byte of address.
- ah = High byte of address.
- cl = Low byte of the count.
- ch = high byte of the count.
- d = Data bytes , from 1 to n.

Formulas:
Address start = ((ah* 256) + al)
Count = n = ((ch * 256) + cl)

Limits:
Address start + Count ≤ 10000 (Hex)

n number of data bytes	Range of address (al ah)	Range of Count (cl ch)
((ch * 256) + cl)	0000 - FFFF (Hex)	0001 - FFFF (Hex)

Notes: Available only in download mode.

ERASE BOOT SECTOR; DOWNLOAD NEW CODE

Wait for new boot code to be downloaded, then check CRC on this new boot code, and if valid, boot code sector is erased and reprogrammed with new code. Printer automatically reboots after program sequence is complete.

ASCII	US	SOH	*d1…d8192*
Hexadecimal	**1F**	**01**	**d1…d8192**
Decimal	31	1	*d1…d8192*

This command is available only in download mode.

12.14 *User flash memory commands*

ERASE USER FLASH SECTOR

Erases a section of user flash memory and sends a carriage return when the operation is complete.

ASCII	GS @ *n*		
Hexadecimal	**1D 40 *n***		
Decimal	29 64 *n*		
Operand:	n	= mode selection:	
Value of *n*:	49	*n* = 49 (ASCII *n* = 1)	Erase User flash Memory
	51	*n* = 51 (ASCII *n* = 3)	Erase User flash (Easy Font)
Returns :	**Operation completed**		
ASCII	CR		
Hexadecimal	**0D**		
Decimal	13		

This command erases all 48K Flash memory sectors allocated to logos storage and fonts storage. Those sectors should be erased: when the logo definition area is full and an application is attempting to define new logos. All logo definitions are erased and must be redefined.

Important: While erasing flash memory, all communication is disabled. To provide feedback to the application, the printer responds to the application when the erase is complete. After sending the Erase User Flash Sector (1D 40-n) command, an application should wait for the response from the printer before sending data. Otherwise, data will be lost. If an application is unable to receive data, it should wait a minimum of five seconds after sending the Erase User Flash Sector (1D 40 *n*) command before sending data.

RETURN USER FLASH MEMORY ALLOCATION STATUS

Returns the amount of Flash memory available in user sections.

ASCII	US	v	*n*
Hexadecimal	**1F**	**77**	**n**
Decimal	31	119	*n*
Operand:	n	= Status select	
	1	Reply the amount of Flash memory available in user section.	
	2	Reply the amount of Flash memory available in User Download font section (Easy Font).	
Limit	Dec:	n =1	n =2
	Hex:	n= 01	n= 02
***Note*:**	Only one user section 48K bytes, n=1= n=2.		
	Returns the number of bytes available as a zero terminated ASCII string.		
	Each digit is coded in decimal.		

12.15 *Peripheral control commands*

GENERATE PULSE FOR CDKO

Generates a pulse Ton, Toff on pin **m** of the drawer kick out connector in accordance with the table below.

ASCII	ESC	p	m	n1	n2
Hexadecimal	**1B**	**70**	**m**	**n1**	**n2**
Decimal	27	112	m	n1	n2

Operands:

m	Selected connector pin
n1	Ton = (n1 * 2ms) Is the on time of the pulse
n2	Toff = (n2 * 2ms) Is the off time of the pulse

Limits:

m = 0 , 1 , 48 , 49 see table below

$0 < n1 \leq n2 \leq 255$

If n2 < n1 ➔ Toff = (n1 * 2ms)

m decimal	Connector	Pin
0 or 48	J7	2
1 or 49	J7	2

PRINT TEST FORM

Prints the current configuration settings on the receipt.

ASCII	US *t*
Hexadecimal	**1F 74**
Decimal	31 116

Note:
This command is effective only at the beginning of a line.

12.16 *Configuration commands*

STORE SELECTED SENSOR THRESHOLD

This command will store the sensor detection threshold in non-volatile memory (NVRAM).

ASCII	GS	s	*m*	*n*
Hexadecimal	**1D**	**73**	**m**	**n**
Decimal	29	115	*m*	*N*

Operands : m = Sensor select
n = Threshold value

Limit : Dec: $0 \leq m \leq 7$
Hex: $00 \leq m \leq 07$
See Table below

Note: This command must be followed by a reset.

"GS s" OPERAND DEFINITION					
m		**Sensor**		**n (Decimal)**	
Decimal	**Hex**	**Sensor**	**Mechanism**	**Limit**	**Default**
0	00	Paper Low	MC/MHTP	$0 \leq n \leq 255$	102
5	05	Top Of Form	MC/MHTP	$51 \leq n \leq 204$	102

TOF SENSOR AUTOCALIBRATION

This command will calibrate the TOF (Top Of Form) sensor.
When this command is received, the paper will advance until the next three TOF marks are detected. The sensor threshold will then be automatically calibrated to the average value for the three TOF marks.
Once the calibration is complete, the paper will be cut.

ASCII	GS	t
Hexadecimal	**1D**	**74**
Decimal	29	116

Note: This sequence is ignored when TOF mode not activated (1F 03 87 n).
If calibration is not possible, « cut » sequences will be ignored and error flag will be raised (see code 1F 76 02 bit 5) .
"Sensor Threshold" value in "Diagnostic Form" will be equal to zero.

SET COMMUNICATION INTERFACE PARAMETERS

This command will store the communication options in non-volatile memory. (NVRAM)

ASCII	US	STX	*n1*	*n2*	*n3*	*n4*	*n5*	*n6*
Hexadecimal	**1F**	**02**	**n1**	**n2**	**n3**	**n4**	**n5**	**n6**
Decimal	31	2	*n1*	*n2*	*n3*	*n4*	*n5*	*n6*

Operands:	n1	Interface selection
	n2 – n6	Parameters
Default	(*)	RS232 , 115200, n , 8 , 1

Values (Hex)

n1 :	-	= x00 = Interface ➔ RS232
n2 :	Bit [0..2]	= x03 = Baud rate ➔ 9600
“	“	= x04 = Baud rate ➔ 19200
“	“	= x05 = Baud rate ➔ 38400
“	“	= x06 = Baud rate ➔ 57400
“	“	= x07 = Baud rate ➔ 115200
“	Bit 4	= x00 = Number of stop bits ➔ 1
“	“	= x08 = Number of stop bits ➔ 2
“	Bit 5	= x00 = Number of Data bits ➔ 8
n3 :	**-**	= x00 = Parity ➔ Odd
“	-	= x01 = Parity ➔ Even
n4 :	**-**	= x00 = Parity Mode ➔ No parity
“	-	= x01 = Parity Mode ➔ Enable parity
n5 :	**-**	= x00 = Handshaking ➔ Xon / Xoff
“	-	= x01 = Handshaking ➔ Dtr / Dsr
n6 :	**-**	= x00 = Error processing ➔ Ignore
“	-	= x00 = Error processing ➔ Print

?P = Parity Error.
?F = Framing Error.
?O = Over run Error.

Notes:

This command will be ignored if one of the parameter is incorrect.

1) **This command is processed only in boot mode. If the printer is running in normal mode, send first command “switch to Boot Mode” (1B 5B 7D).**
2) **This command must be followed by “Printer Reset” command (1D FF).**

SET KNIFE OPTION

This command will store the knife option in non-volatile memory.

ASCII	US	ETX	*STX*	*n*
Hexadecimal	**1F**	**03**	**02**	**n**
Decimal	31	3	*2*	*n*

Operand:	n	= mode selection
Value Decimal	0	Disabled
	1	Standard mode
	2	Low noise Mode (lower speed)
Default	0	

Limit:	Dec :	$0 \le n \le 2$
	Hex:	$00 \le n \le 02$
Note:	This command must be followed by a reset.	

PAPER LOW SENSOR OPTION

This command will store the paper low sensor option in non-volatile memory (NVRAM).

ASCII	US	ETX	*ETX*	*n*
Hexadecimal	**1F**	**03**	**03**	**n**
Decimal	31	3	*3*	*n*

Operand:	n	= mode Selection
Value Decimal	0	Disabled
	1	Enabled (Sensor)
	2	Enabled (switch)
Default:	0	

Limit:	Dec:	$0 \le n \le 2$
	Hex:	$00 \le n \le 02$
Note:	This command must be followed by a reset.	

SET PAPER WIDTH PARAMETER

This command will store the paper width setting in non-volatile memory (NVRAM).

ASCII	US	ETX	*BS*	*n*
Hexadecimal	**1F**	**03**	**08**	**n**
Decimal	31	3	*8*	*n*

Operand:	n	= width selection
Value Decimal	0	80.0 mm
	1	82.5 mm
Default:	0	

Limit:	Dec:	$0 \leq n \leq 1$
	Hex:	$00 \leq n \leq 01$
Note:	This command must be followed by a reset.	

SET PARTIAL CUT DISTANCE FOR MH/MCTP MECHANISM

This command will store the cut distance setting in non-volatile memory (NVRAM).

ASCII	US	ETX	*LF*	*n*
Hexadecimal	**1F**	**03**	**0A**	**n**
Decimal	31	3	*10*	*n*

Operand:	n	= Value **:**
Value Decimal	0	0 steps
	1	8 steps
	2	16 steps (Default)
	3	24 steps
	4	32 steps
Note:	This command must be followed by a reset.	

SET PRE-HEATING MODE

This command will store the print-head pre-heating option in non-volatile memory (NVRAM).

ASCII	US	ETX	*VT*	*n*
Hexadecimal	**1F**	**03**	**0B**	**n**
Decimal	31	3	*11*	*n*

Operand:	n	= Mode selection
Value Decimal	0	Disabled
	1	Enabled
Default	0	

Limit:	Dec:	$0 \le n \le 1$
	Hex:	$00 \le n \le 01$

Note: When this mode is enabled, the controller monitors the print-head temperature and keeps it above 19-24°C. Furthermore, if the temperature is around and the pre heating disabled, an automatic wake up of the pre heating functionality will permit to have the temperature around 19-24°C.

This command must be followed by a reset.

DEFAULT CODE PAGE

This command will store the default code page in non-volatile memory (NVRAM).

ASCII	US	ETX	*Ç*	*n*
Hexadecimal	**1F**	**03**	**80**	**n**
Decimal	31	3	*128*	*n*

Operand:	n	= code page selection
Value Decimal	0	437 : US
	6	858 default
Value Hex	00	437 : US
	06	858 default

Note: The default code page selects which code page will be initially used by the printer until it is changed using the “ESC t” command.

This command must be followed by a reset.

SET TOP OF FORM MODE

This command will store the Top of Form option in non-volatile memory (NVRAM).

ASCII	US	ETX	*ç*	*n*
Hexadecimal	**1F**	**03**	**87**	**n**
Decimal	31	3	*135*	*n*

Operand:	n	= Mode selection
Value Decimal	0	Disabled
	1	Enabled
Default	0	

Limits:	Dec:	$0 \leq n \leq 1$
	Hex:	$00 \leq n \leq 01$
Note:	This command must be followed by a reset.	

SET COVER SENSOR OPTION

This command will store the Cover option in non-volatile memory (NVRAM).
Only with paper Entry auto load mode (Code 1F 03 A2 n).

ASCII	US	ETX	*ë*	*n*
Hexadecimal	**1F**	**03**	**89**	**n**
Decimal	31	3	*137*	*N*

Operand:	n	= Mode selection
Value Decimal	0	Disabled
	1	Enabled
Default	0	

Limits:	Dec:	$0 \leq n \leq 1$
	Hex:	$00 \leq n \leq 01$
Note:	This command must be followed by a reset.	

SET MECHANISM TYPE

This command will store the Mechanism option in non-volatile memory (NVRAM).

ASCII	US	ETX	*ï*	*n*
Hexadecimal	**1F**	**03**	**8B**	**n**
Decimal	31	3	*139*	*N*

Operand:	n	= Mechanism selection
Value Decimal	7	MC/MHTP Standard
	8	MC/MHTP Bi – Station
Default	7	

Limit:	Dec:	n = 7	or	n = 8
	Hex:	n = 07	or	n = 08

Note: This command must be followed by a reset.

SET ADDITIONAL DISTANCE SEARCH TO FIND ONE TOF

This command will store the additional distance research TOF option in non-volatile memory.

ASCII	US	ETX	*ù*	*d*
Hexadecimal	**1F**	**03**	**97**	**d**
Decimal	31	3	*151*	*d*

Operand:	d	= Additional distance search value mm

Limit:	Dec:	$10 \leq d \leq 255$
	Hex:	$0F \leq d \leq FF$

Formulas: Maximum Search Mark (mm) = (Inter Mark Distance + d)

Note: This command must be followed by a reset.

SET INTER-MARK DISTANCE

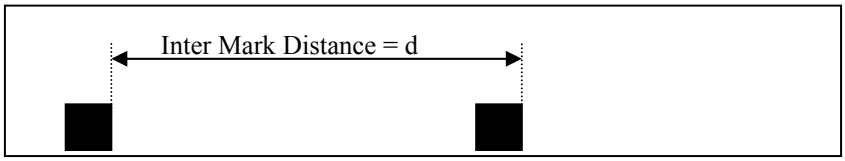
This order enables us to define the distance between two black marks (selection in non-volatile).

ASCII	US	ETX	*ÿ*	*d*
Hexadecimal	**1F**	**03**	**98**	**d**
Decimal	31	3	*152*	*d*

Operand: d = Value mm

Limit:	Dec:	25 ≤ d ≤ 255	Paper Entry = Clamshell =25mm
	Hex:	19 ≤ *d* ≤ FF	
Limit:	Dec:	27 ≤ d ≤ 255	Paper Entry = Auto Load =27mm
	Hex	1B ≤ d ≤ FF	

Note: This command must be followed by a reset.
See Command 1F 03 A2 n for Paper Entry.



SET CUT DISTANCE FOR TOF

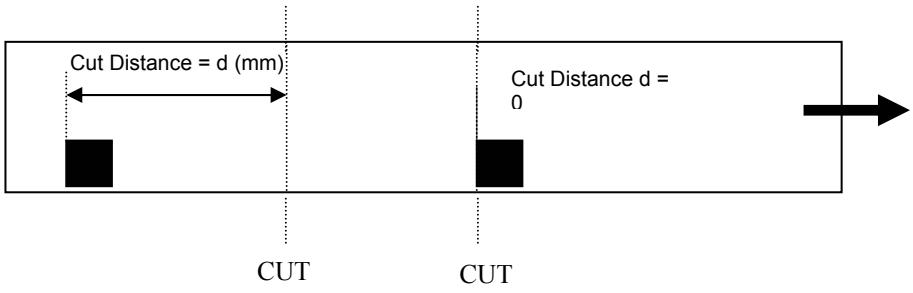
This order enables us to define the distance between the line of cut and the black mark (selection in non-volatile memory).

ASCII	US	ETX	*Ö*	*d*
Hexadecimal	**1F**	**03**	**99**	**d**
Decimal	31	3	*153*	*d*

Operand: d = Value mm < Inter Mark Distance

Limit :	Dec:	0 ≤ *d* ≤ 255
	Hex:	00 ≤ *d* ≤ FF

Note: This command must be followed by a reset.



SET VOLTAGE MECHANISM

This command will store the Voltage Mechanism parameter setting in non-volatile memory.

ASCII	US	ETX	*í*	*n*
Hexadecimal	**1F**	**03**	**A1**	**n**
Decimal	31	3	*161*	*n*

Operand:	n	= Mode selection
Value Decimal	0	12 Volts
	1	24 Volts
Default	1	

Limit :	Dec:	$0 \leq n \leq 1$
	Hex:	$00 \leq n \leq 01$
Note :	Voltage range: components tolerance not taken into consideration.	
	This command must be followed by a reset.	

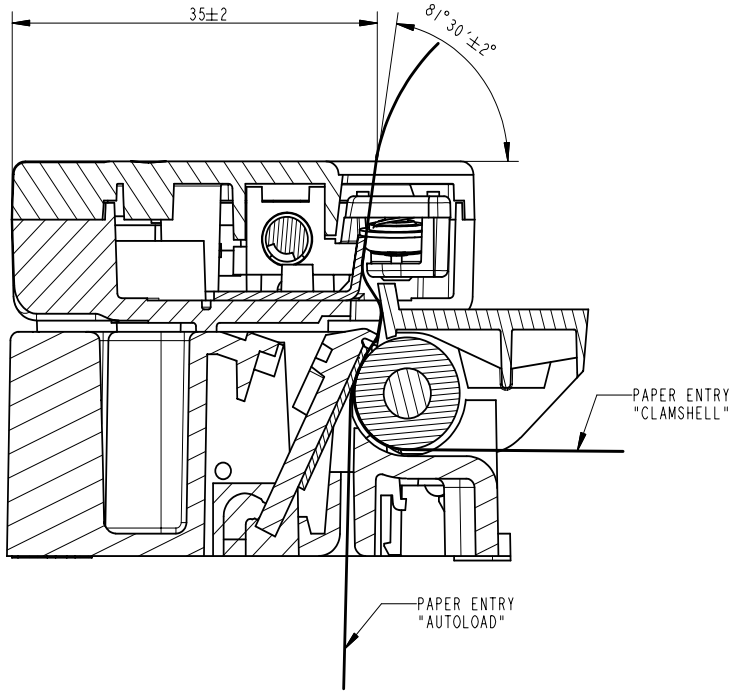
SET PAPER INTRODUCTION TYPE

This command will store the set paper introduction type selection in non-volatile memory.

ASCII	US	ETX	*ó*	*n*
Hexadecimal	**1F**	**03**	**A2**	**n**
Decimal	31	3	*162*	*n*

Operand:	n	= Mode selection
Value Decimal	0	Clamshell
	1	Auto Load
Default	0	(See figure below)

Limit :	Dec:	0 ≤ n ≤ 1
	Hex:	00 ≤ n ≤ 01
Note :	This command must be followed by a reset.	



SET 2ND PAPER OUT SENSOR

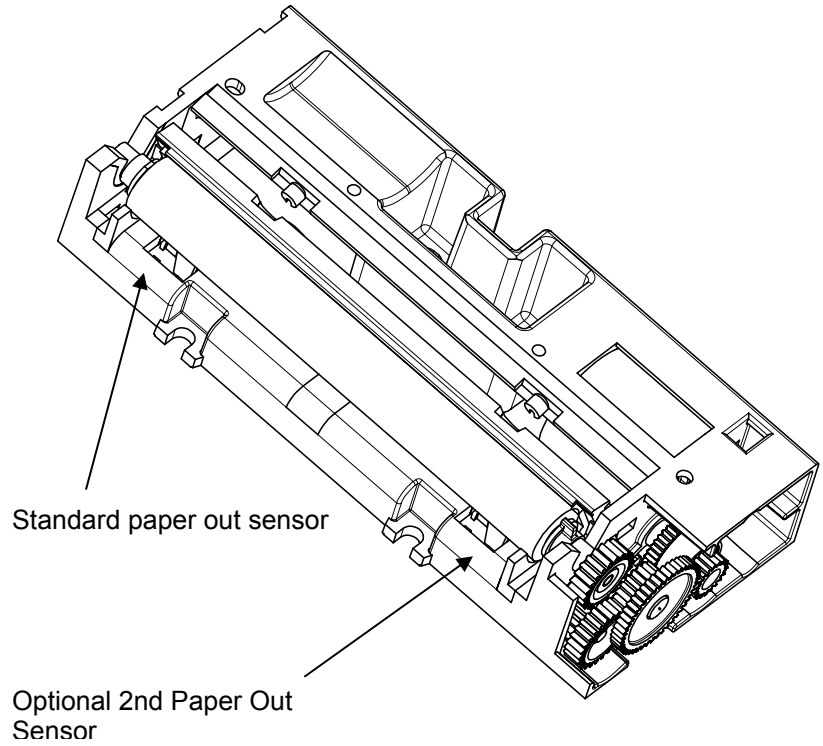
Synopsis:	2nd Paper out sensor option (NVRAM).			
ASCII	US	ETX	®	*n*
Hexadecimal	**1F**	**03**	**A9**	**n**
Decimal	31	3	*169*	*n*

Operand:	n	= mode Selection
Value Decimal	0	Disabled
	1	Enabled Paper out sensor
Default:	0	

Limit:	Dec:	$0 \le n \le 1$
	Hex:	$00 \le n \le 01$

Description: This command will store the paper out sensor option in non-volatile memory (NVRAM).

Note: Only with TOF mode disabled (Code 1F 03 87 n).
This command must be followed by a reset.
Two sensors are provided with double station (*two paper rolls – See 1F 03 8B n*).



SET PRINT DENSITY

Set the print density (energy applied to paper) in percent relative to nominal energy.
This command will store the Value in non-volatile memory (NVRAM).

ASCII	US	VT	*N*	*R*	*J*	*n*
Hexadecimal	**1F**	**0B**	**4E**	**52**	**4A**	**n**
Decimal	31	11	*78*	*82*	*74*	*n*

Operand: n = Percentage of the nominal heating time value
Default 100%

Limit: Dec: $80 \leq n \leq 120$
Hex: $50 \leq n \leq 78$

Note : This command must be followed by a reset.

WARNINGS!!

- **Choose a print density setting no higher than necessary to achieve acceptable print density.**
- **Failure to observe this rule may result in a printer service call.**
- **Failure to observe this rule may void the printer warranty.**
- **Consult your Axiohm technical support specialist if you have questions.**

RESET NVRAM PARAMETERS

This command will reset the non-volatile memory configuration items to their default values.
Followed by reboot printer.

ASCII	US	CR	*C*	*L*	*E*	*n*
Hexadecimal	**1F**	**0D**	**43**	**4C**	**45**	**n**
Decimal	31	13	*67*	*76*	*69*	*n*

Operand: n = Security byte

Limit Dec: n = 0
Hex: n = 00

Note : This command is processed only in boot mode.
If the printer is running in normal mode, send first command “switch to Boot Mode” (1B 5B 7D).

SET PARTIAL CUT BI-STATION MODE

This command will store the Value in non-volatile memory (NVRAM).

ASCII	US	SO	*SOH*	*nL*	*nH*
Hexadecimal	**1F**	**0E**	**01**	**nL**	**nH**
Decimal	31	14	*1*	*nL*	*nH*

Operand: n = ((nH * 256) + nL)
= Distance partial cut (motor steps).

Limit	Dec:	100< *n* ≤ 1240	Default n = 676	Paper Width 80mm
	Hex:	64 < n ≤ 04D8	Default n = 02A4	
Limit	Dec:	100< *n* ≤ 1256	Default n = 684	Paper Width 82.5mm
	Hex:	64 < n ≤ 04E8	Default n = 2AC	

Note: This command must be followed by a reset.